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EPIDEMIOLOGY AND CONTROL OF FILARIASIS

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India accounts for about 41% of the global burden of lymphatic filariasis. India is a signatory to the WHO 1997 resolution on elimination of filariasis. This political commitment demands a technical review of the epidemiology of the disease in the country, and the control efforts undertaken so far, so that a sound elimination strategy can be developed. The subject has, therefore, been reviewed under the titles: epidemiology of filariasis, geographical distribution, trend of filariasis over course of time, age and gender distribution of filariasis, filariasis control, towards elimination of filariasis, transmission control, morbidity control and filariasis elimination cell. Initiating action using the available resources, technical know-how and partnership approach are the needs of the hour.

Key words : Filariasis; India; Epidemiology; Elimination; Control; *Wuchereria bancrofti; Brugia malayi.*

Introduction ---- 425
Epidemiology of filariasis ---- 426
Filariasis control ---- 435
Towards elimination of filariasis ---- 438
Transmission control ---- 440
Morbidity control ---- 442
Filariasis elimination cell ---- 443
Conclusions ---- 443
References ---- 444

INTRODUCTION

According to the latest global estimate, India alone contributes to about 41% of the global burden of lymphatic filariasis (Michael *et al.*, 1996). Filariasis

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has been identified as the second most important cause of permanent disability (WHO, 1995), and one of the six diseases (out of more than 100 considered) that are amenable for elimination (Ottesen *et al.*, 1997). The World Health Assembly (WHA) has passed a resolution for the global elimination of this disease (WHO, 1999). India is a signatory to this WHA resolution. Consequently, the current National Filariasis Control Programme (NFCP) is fast moving from an urban oriented control programme to a comprehensive national filariasis elimination programme (Das and Pani, 2000). In view of this, it is important to review the current concepts in the epidemiology and control of the disease, based on which the elimination strategy may be developed and implemented.

EPIDEMIOLOGY OF FILARIASIS

Filariasis problem in India

India is endemic for filariasis since time immemorial. History of filariasis in this country, dates way back from 6th Century B.C. (description of disease that resembles filariasis found in chapter 12 of the Susruta Samhita). Later, Clarke in 1709, observed swelling of the legs in Cochin, South India, and termed it Malabar legs (NFCP, 1984). Subsequent discovery of microfilariae in the peripheral blood by Lewis, in 1872, in Kolkata led to carrying out spot surveys in many parts of India by different workers like Cruickshank and Wright (1914) in Cochin, Roy and Bose (1922) in Orissa, Cruickshank *et al.* (1923) in a village near Chennai and Korke (1927a; 1927b, 1928, 1929) in Bihar and Orissa that confirmed the wide-spread presence of bancroftian infections. Iyengar (1932, 1933, 1938) conducted detailed epidemiological studies and confirmed the occurrence of *Brugia malayi* infection in Kerala.

Current burden of filariasis in India in comparison to global situation can be visualized from the following recent estimates. Globally, about 1,100 million people live in areas endemic for lymphatic filariasis (in 73 countries), exposed to the risk of infection. There are about 120 million cases of filariasis, either having patent microfilaraemia or chronic filarial disease (Michael *et al.*, 1996). It has been estimated that in India, there are 429 million people exposed to the risk of infection, 31.3 million individuals with patent microfilaraemia, 7.4 million lymphoedema cases and 12.9 million hydrocele cases; accounting for 39.0%, 37.9%, 46.4% and 48.1% of respective, global estimates (Michael *et al.*, 1996).The relative burden for the two parasites, *Wuchereria bancrofti*

and *B. malayi* (global and Indian estimates) are compared in Table 1. India alone contributes to about 41% of the overall global burden.

Table 1 : Relative magnitude problem due to *W. bancrofti* (Wb) and *B. malayi* (Bm), comparison between global and Indian estimates.

Parameters	Global		India		India as % of global	
	Wb	Bm	Wb	Bm	Wb	Bm
Microfilaria carriers	73.3	10.4	29.5	1.8	40.2	17.3
Lymphoedema cases	13.2	2.8	6.9	0.9	52.3	32.1
Hydrocele	26.8	NA*	12.9	NA*	48.1	NA*
Total cases	106.2	12.9	45.5	2.6	42.8	20.2

The total cases exclude a proportion of individuals who may have overlapping infection/lymphoedema/hydrocele.

* not applicable, since *B. malayi* does not result in hydrocele.

The estimates are as per Michael *et al.* (1996).

The parasites

In India, lymphatic filariasis is caused by two lymphatic dwelling nematode parasites *W. bancrofti* and *B. malayi*. These parasites exhibit cyclo-developemental life cycle, alternating between human host and vector mosquitoes. The adult parasites inhabit the lymphatics and lymph nodes of man. After mating, the ovo-viviparous adult female releases microfilaria which reach and circulate in blood, exhibiting a nocturnal periodicity (Pani and Dhanda, 1994). Sub-periodic form of *W. bancrofti* has been reported from the Nicobar Islands (Tewari *et al.*, 1995). The microfilaria, when picked up by susceptible vectors, grow through three larval stages and the third stage larvae are infective to man. This infective L_3 grows through two more stages (L_4 and L_5) to become an adult, which becomes sexually mature in about a year. The fecundic life span (period for which adult female produces microfilaria) has been estimated to be 5.4 years for *W. bancrofi* (Vanamail *et al.*, 1996) and 3.5 years for *B. malayi* (Sabesan *et al.*, 1991). The life span of microfilaria is estimated to be about 6 months (WHO, 1997a).

The vectors

In India, *W. bancrofti* is transmitted to man by the ubiquitous mosquito, *Culex quinquefasciatus*. This mosquito breeds in polluted water bodies in and around human habitation. This vector is found abundantly in all urban, semi-urban areas, as well as in rural areas, which are undergoing rapid urbanization. In course of time, this vector mosquito has become highly anthropophilic. *B. malayi* in India, is transmitted by *Mansonia* spp. (*M. annulifera, M. uniformis,* and *M. indiana*). These mosquitoes breed in freshwater bodies in association with hydrophytes such as *Pistia, Eichornia* and *Salvinia. Mansonia* spp. also show high degree of anthropophilic index (Sabesan *et al.*, 1991a). *Aedes (Finlaya) niveus* is the vector of subperiodic *W. bancrofti* in Nicobar islands (Tewari *et al.*, 1995).

Transmission dynamics

Transmission dynamics of filariasis involving the parasite, human host and the vector mosquitoes are indeed complicated. Several factors influence the process and its outcome. Vector population density, biology and behaviour are important. Environmetal factors influence the density critically. The parasite load and its distribution in the vector also influence the transmission. For example, in *W. bancrofti- C. quinquefasciatus* at a low parasite density in human host, a process of facilitation is observed resulting in effective transmission unlike other parasite-vector systems (Subramanian *et al.*, 1998). The transmission dynamics also depend upon the prevalence of infection and its intensity in human host (Das *et al.*,1990). The distribution of parasite in human host and the periodicity of parasitaemia are also important. For example, in Pondicherry the nocturnally periodic *W. bancrofti* reaches a peak density in the peripheral blood around 1 a.m., which is also the peak biting periodicity of the vector *C. quinquefasciatus* in this locality (Vanamail and Ramaiah, 1991). There are several quantitative estimates as to the minimum number of infective bites required for successful patient infection, and threshold levels of human infection for continued transmission (Rajagopalam *et al.*, 1977; Ramaiah *et al.*, 1994).

Pathogenesis

The parasite infective larvae, after being dropped from the mouth of the biting vector mosquito on human skin, make their way through the site of the bite (depending upon the microclimatic conditions) and find their way to the lymph vessels (Pani and Dhanda, 1994). The parasite moults twice to reach

adult stage and after sexual maturity, mate and the female releases microfilaria. The adult parasites result in lymphatic abnormalities such as dilation, kinking collateral formation etc. (reviewed by Pani and Lall, 1998). These changes are initially transient reversible, but subsequently become permanent irreversible (WHO, 1997a).

Despite these changes, in most cases, the pathology remains sub-clinical for long periods of time, resulting in their escaping clinical detection. Due to this reason, many parasite carriers remain asymptomatic for years (Pani *et al.*, 1991). Immunologically, this is a state of parasite specific tolerance with anti-inflammatory response and the parasite is not rejected. In course of time, the lymphatic dilatations increase resulting in lymphstasis and clinical lymphoedema. At this stage, immuno-pathological changes take over, resulting in clearance of parasite. Therefore, in clinical practice, most clinical cases of filarial lymphoedema do not show the presence of parasite (Pani *et al.*, 1991a). Depending on the site of the adult parasite localization and the lymphatics invloved, the pathogenesis vary (Pani and Dhanda, 1994). Adult parasites in testicular lymphatics of male (the most preferred site of *W. bancrofti* in this gender) result in passive fluid accumulation between the layers of tunica resulting in hydrocele, with minimal immuno-pathology (and therefore, the microfilaria detection being higher in these cases compared to lymphoedema) (Das *et al.*, 1994; Pani and Lall, 1998). Adult parasites located in deep inguinal or femoral lymphatics in either gender result in gross immuno-pathology and lymphoedema development. Lymphoedema is initially reversible but slowly becomes irreversible. Large quantity of free fluid remains trapped in lymphatic and tissue spaces until late stages of lymphoedema, where fibrosis takes over resulting in solid oedema (Pani and Yuvaraj, 1996). The skin changes gradually and secondary bacterial infection (particularly due to Group A Beta haemolytic *Streptococus*) in the protein rich lymph results in repeated attacks of lymphangitis, lymphadinitis and filarial fever (described as acute adenolymphangitis: ADL) (VCRC, 2000). Repeated attacks of ADL worsen the lymphoedema until elephantiasis (roughening and thickening of skin) results (Pani *et al., 1995*). In few cases of *W. bancrofti* infection, a specific hypersensitive response develops, directed against the microfilaria, resulting in a allergic disease with lungs as the target organ called tropical pulmonary eosinophilia (TPE) (WHO. 1992).

Nature of morbidity

Hydrocele in males and lymphoedema in both genders are the important clinical manifestations. Acute episodic ADL attacks appear, resulting

in lymphangitis, lymphadenitis, epididymo-orchitis, mastitis etc. with or without systemic manifestations such as fever, nausea and vomiting. The other manifestations include TPE, filarial arthritis, endo-myocardial fibrosis, haematuria and glomerulo-nephritis. Clinical consequence of filariasis can be judged from the following facts. It is a leading cause of permanent and long term disability in the form of progressive lymphoedema leading to disfiguring elephantiasis (WHO, 1992, 1995), progressive hydrocele or loss of respiratory function due to chronic tropical pulmonary eosinophilia (TPE) (Vijayan *et al.*, 1991; WHO, 1992; Pani *et al.*,1995). Patients of filariasis, particularly lymphoedema suffer from episodic attacks of ADL which cause acute suffering, incapacitation, debilitating the person (Addis *et al.*, 1994; Pani *et al.*, 1995; Pani and Srividya, 1995; Ramaiah *et al.*, 1996; Dunyo *et al.*, 1997). Morbidity due to filariasis also includes renal disease (haematuria and glomerulo-nephritis), arthritis, endomyocardial fibrosis etc. (WHO, 1992; Dreyer *et al.*, 1992; Ottesen *et al.*, 1997).

Prevalence, incidence and distribution

Prevalence of infection and disease in human population is measured as proportion infected with detectable microfilaraemia (mF rate in%) and proportion with disease (disease rate in %). The endemicity of an area or a given population refers to proportion positive for infected or diseased or both. The mF rate is usually measured in terms of population positive in a night door to door blood survey (usually 20 cubic mm peripheral blood sample). Although, the technique has a poor sensitivity (since concentration techniques such as membrane filtration detect 2-3 times higher numbers of carriers), it has been used uniformly under Indian national programme, providing comparable data. The prevalence of disease under the national programme is recorded as the proportion of population with gross filarial pathology, often detected by health worker questionnaire about lymphoedema and hydrocele, rather than by any physical examination. For this reason, the disease prevalence rates reported are expected to be much lower than the disease prevalence obtained in clinical examination by a physician (Pani *et al.*, 1991). The occurrence of episodic attacks of ADL in the population is measured as annual incidence of these attacks/1000 population. Till-date, data on this aspect is available only for research studies, since ADL surveillance has not been carried out under the national programme.

Geographical distribution

Recently, the available data on the distribution of disease and infection

prevalence were compiled from the reports of the National Filariasis Control Programme and other published data. This data from 280 districts surveyed until 1995 was used for the preparation of filariasis distribution map using a GIS platform (Sabesan *et al.*,2000). Of the 25 states/union territories in India, for which surveys have been carried out, 22 are endemic, and nine states (Andhra Pradesh, Bihar, Gujarat, Kerala, Maharashtra, Orissa, Tamil Nadu, Uttar Pradesh and West Bengal) contribute to 95% of overall burden (Table 2).

Table 2 : Lymphatic filariasis in different states and union territories of India*.

State/union territory	Population in million			Average endemicity
	At risk	Micro-filaraemics	With SLF	
States				
Andhra Pradesh	53.47	3.37	1.48	10.79
Assam	10.38	0.39	0.09	4.87
Bihar	63.95	4.34	5.95	13.81
Goa	1.28	0.01	0	0.20
Gujarat	18.25	1.1	0.14	3.91
Haryana	4.51	0.05	0	0.97
Himachal Pradesh	0	0	0	0
Jammu and Kashmir	3.2	0.05	0	0.95
Karnataka	11.75	0.75	0.08	3.09
Kerala	31.38	2.49	2.45	20.69
Madhya Pradesh	23.86	0.56	0.08	3.09
Maharashtra	18.55	0.95	0.17	7.27
Megalaya	0	0	0	0
Nagaland	0.39	0.01	0	0.09
Orissa	27.05	2.39	1.51	8.18
Punjab	0	0	0	0
Rajasthan	0	0	0	0
Tamil Nadu	38.89	2.45	1.3	6.57
Tripura	0.7	0.1	0.01	0.20
Uttar Pradesh	99.72	7.02	7.52	8.71
West Bengal	20.09	0.98	0.03	13.71
Union Territories				
Andaman and Nicobar	0.22	0.01	0	13.90
Chandigarh	0.64	0.01	0	0.40
Dadra and Nagar Haveli	0.13	0.01	0	0.01
Daman and Diu	0.1	0.01	0.01	0.67
Lakshadweep	0.05	0.01	0	9.12
Pondicherry	0.76	0.03	0.01	8.37
Total	429.32	27.09	20.83	

* modified from Sabesan *et al.* (2000).

Bancroftian filariasis is the predominant form of infection spread over 13 states and 5 union territories, whereas *B. malayi* is confined to only small pockets in the states of Kerala, Andhra Pradesh, Tamil Nadu, Orissa, Madhya Pradesh, West Bengal and Assam. *W. bancrofti* is prevalent almost all over India except in some of north and north-western states (like Jammu and Kashmir, Punjab, Haryana, Himachal Pradesh and Rajasthan) and some north-eastern states like Nagaland, Manipur, Tripura, Meghalaya, Sikkim and Mizoram. The microfilaraemia levels were found to be very high in some parts of Uttar Pradesh, Bihar, Andhra Pradesh and Tamil Nadu.

An overview of the traditional endemic foci shows a concentration of infection mainly around river basins, and eastern and western coastal parts of India. Demographic changes and associated activities have facilitated the spread of infection and disease to other parts of the country. While the bancroftian foci are distributed over the climatic zones of humid subtropical and tropical wet and dry regions, the brugyian foci are restricted mainly to tropical wet region. Interestingly, the *B. malayi* belt in the central-western coastal area is fast shrinking in its length and breadth. The reclaimation of land, on account of urbanization over a period of years has resulted in the destruction of vector breeding habitats (disappearance of ponds and floating weeds, the host plants of vectors of *Mansonia* spp.) and thereby *B. malayi* is getting eliminated as a public health problem. At the same time in reclaimed land, *Culex* vector mosquito gets established and hence *W. bancrofti* is getting established (Sabesan *et al.*, 2000).

Trend of filariasis over course of time

The estimated population residing in endemic areas and exposed to the risk of infection, persons harbouring microfilaria in their blood and persons with disease manifestations in different years (1962-1995) are presented in Table 3. The increasing trend observed in these estimates is primarily due to the increasing size of the population, complemented with rapid urbanization. Apart from this, the changes in land use patterns, the newer water resource development projects, deforestation, rapid urbanization and industrialization and above all the population movement at higher rate would have resulted in the introduction of infection to the newer (non-endemic) areas (Das, 1998). Based on the results of various delimitation surveys conducted till 1995, the filarial situation over last five decades is presented in Table 4. Out of the 283 districts surveyed, 250 were found to be endemic, the level of endemicity being low (<1.0%) in 74 districts, moderate (1-10%) in 100 districts and high

(>10%) in 76 districts. A declining trend is observed in high endemic districts in the past four decades. This is partly due to various control measures in vogue in these areas. On the other hand, there is an increase in the number of low and moderate endemic districts and this could reflect the increase in the problem in some rural areas (where there is no control) as well as spread of the disease to newer areas.

Table 3 : Filarial infection status at different years in India*.

Year	Estimated population at risk of infection (millions)			Estimated number of cases (millions)		Number of cases per 100 popn. at risk	
	Rural	Urban	Total	mF	Disease	mF	Disease
1962	40.16	24.08	64.24	5.0	4.40	7.8	6.8
1970	84.91	51.39	136.30	11.3	8.00	8.3	5.9
1976	174.08	62.05	236.13	18.3	14.40	7.8	6.1
1981	221.92	62.08	304.00	21.7	15.84	7.2	5.2
1985	251.80	90.56	342.36	23.7	17.56	6.9	5.1
1989	275.36	98.94	374.30	25.0	19.00	6.7	5.1
1994	302.87	108.78	411.65	26.9	20.40	6.5	45.0
1995	315.11	113.17	428.28	28.0	21.20	6.5	5.0

* Filariasis and its control in India. Country report presented during inter-country workshop on control of lymphatic filariasis in South East Asia, 26-28 Nov. 97, Pondicherry.

Age and gender distribution of filariasis

Understanding the age and gender distribution of the disease is important to identify the target groups for intervention. The prevalence of infection and disease are significantly higher in males compared to females (Brabin, 1990; Pani *et al.*, 1991; Pani and Srividya, 1995; Micheal *et al.*, 1996). Young adults in age group of 15-44 years recorded the highest prevalence of infection. This group also formed the predominant age class in the population. Micheal *et al.* (1996) estimated that globally, this age class contributes to 58.5% of all microfilaria (mF) carriers, 47.2% of lymphoedema cases and 58.3% of hydrocele cases, and constituted 46.9% of the total population. Children and young adults below the age of 20 years also recorded high prevalence/infection, detected by newer techniques for antigenaemia. The prevalence in these individuals ranged between 6.74 in South India (VCRC, unpublished data)

and 7.70% in Ghana; contributing to 11.2% and 27.7% of all antigenaemic persons in the community (Gyapong *et al.*,1998). This suggests that they are also infected, but do not exhibit mF in the night in peripheral blood for some or other reason. Therefore, coverage of mass treatment in these age classes will be crucial.

Table 4 : Trend of filariasis over past five decades in India*.

Period	No. of districts		No. and (%) of districts with endemicity of			
	Surveyed (cumulative)	Found to be endemic	0%	<1%	1%-10%	>10%
Pre- 1961	112	109	3 (2.7)	12 (10.7)	32 (28.6)	65 (58.0)
1961-1970	161	152	9 (5.6)	24 (14.9)	47 (29.2)	81 (50.3)
1971-1980	243	211	32 (13.2)	60 (24.7)	71 (29.2)	80 (32.9)
1981-1990	287	255	32 (11.2)	77 (26.8)	104 (36.2)	74 (25.8)
1991-1995	289	257	32 (11.1)	76 (26.3)	104 (36.0)	77 (26.6)

* modified from Sabesan *et al.* (2000).

Prevalence of chronic disease rises monotonically from young adult age classed (about 15 years) onwards to reach a peak in older age classes due to a cumulative effect, as chronically diseased persons remain life long diseased (Brabin, 1990; Pani *et al.*, 1991). The incidence of acute ADL also shows a similar age pattern as chronic disease prevalence, since episodes of ADL predominantly occur in persons having heavy chronic disease (Ramaiah *et al.*, 1996). Males record very high prevalence of disease particularly due to occurrence of hydrocele. However, if hydrocele is not considered, the patterns are similar for both the genders (Pani *et al.*, 1991).

The social impacts of the disease in terms of marriage prospects, stigma within the community, job opportunities etc. are high. The degree of stigma is associated with the severity and visibility of the disease (Evans *et al.*, 1993; Lu *et al.*, 1998). There is a considerable psycho-social stress on the individual and families including sexual disabilities of men afflicted with hydrocele or genital abnormalities and of women with lymphoedema of breasts or genitals (Dreyer *et al.*, 1997) Finally, the poor quality of life of individuals with the disease is obvious (Appavoo *et al.*, 1999).

In 1993, the global burden of filariasis was seen as a serious underestimate due to lack of inclusion of acute disease morbidity (World Bank, 1993). The disease is causing direct and indirect economic losses in

productivity and functional impairment (Evans *et al.*, 1993; Ramu *et al.*, 1996; Ramaiah *et al.*, 1997; Ramaiah *et al.*, 1998; Ramaiah *et al.*, 1999; Ramaiah *et al.*, 2000a). Recently, it has also been estimated that economic loss to India is to the tune of US $ 840 million (Ramaiah *et al.*, 2000b) and to US $ 1.5 billion (Ottesen *et al.*, 1997) per annum.

FILARIASIS CONTROL

In India, organized efforts to control filariasis were initiated as early as 1933 in Kerala state. "Filariasis control works" was launched by the erstwhile state of Travancore. Vector control in terms of removal of 'pistia' plants from the infested ponds was done for brugian filariasis control in the state (Jaswanth Singh *et al.*, 1956). To develop a national strategy, a pilot scale programme for the control of filariasis was launched in 1949 in the state of Orissa. The objectives of the project were to evaluate the suitability and efficacy of three different methods of control: (a) mass administration of diethylcarbamazine (DCE) to all community members, (b) recurrent anti-larval measures and (c) recurrent anti-adult measures. The results showed that all these methods were effective, although each had its own advantages/ disadvantages. Therefore, it was recommended that a multiple approach, using all the three methods was appropriate for the control of filariasis. Based on these findings, a countrywide National Filariasis Control Programme (NFCP) was launched with the co-operation of United States Technical Co-operation Mission (now USAID) during 1955-56. The original objectives of the NFCP were to carry out filariasis survey in different states of the country where the problem was known to exist, to undertake large scale pilot studies to evaluate the known methods of filariasis control in selected areas in different states, and to train professional and ancillary personnel required for the programme (NFCP, 1984). The mass treatment was carried out over a period of 5 successive days with daily doses of 4 mg of DEC/kg body wt. The mosquito control operations consisted of both anti-adult (indoor residual spray of dieldrin 50 mg/sq ft) and anti-larval measures (water soluble BHC powder, 6.5% gamma). This programme was continued for 5 years and 5.62 million persons out of 14.1 million (total of population where the porgramme was implemented) in 47 control units were covered under the mass chemotherapy programme. The coverage of full five-day course ranged between 38.3% and 97.6% in different units (Rajagopalan and Pani, 1991). On an average, 16.5% of the population covered complained of adverse reactions. The reduction in microfilaria density ranged between 10.95 - 84.6% in one year and the programme has been assessed and modified from time to time. Apart from this, several research studies have

also been undertaken, which have contributed to the optimization of large scale control efforts in India.

First five years' activity of the NFCP was reviewed by ICMR assessment committee and it recommended that the programme be modified and that control be based solely on measures against larvae of vector, *Culex fatigans* (now *quinqefauciatus*), directed to urban endemic areas. It was recommended that the mass administration of DEC be abandoned. There was poor coverage in most areas and unpleasant reactions following administration. The drug failed to clear the microfilaria in some individuals and in some areas the reduction in microfilaraemia did not persist. The decline in infectivty rate of mosquitoes was not appreciable in most areas (Sasa, 1976; NFCP, 1984; NFCP, 1995).

The activities of the NFCP were subsequently reviewed by the second assessment committee in 1970 and it was recommended to carry out selective chemotherapy by detection of parasite carriers (by night blood surveys) and treatment (6gm/kg/day/12 days). Apart from this, it was also recommended to use temophos (abate) and pyrosene in oil as larvicides. These recommendations have been implemented in urban areas since 1971. Although, the programme was also reviewed by a third (1982) and a fourth (1995) assessment committees, the control strategy has not undergone any major change (NFCP, 1995). The fourth committee has suggested the introduction of medicated salt in a phased manner, but this has not been undertaken (except in one district in Tamil Nadu). Currently, a total population of 40 million in urban areas, out of 109 million in urban (37%) and 428 million in entire India (9%) is covered under the programme (NFCP, 1995).

The need for formulation of a revised strategy to cover large population of India (particularly in rural areas) was felt necessary. For this, a WHO sponsored workshop was organized by the NICD, NMEP; Directorate of Health and Family welfare, and the Government of India in January, 1996. The pilot strategy is based on the hypothesis that single annual dose of DEC as a community level administration with a reasonable coverage may interrupt the transmission in course of time and prevent the occurrence of new cases of filariasis in the area. The revised pilot strategy has the following components (NICD/NMEP, 1996):

* Single dose DEC mass chemotherapy currently called mass drug delivery, (MDD) at dosage of 6mg/kg of body wt (excluding children below one year and pregnant women) for 2-3 years (currently extended to 5 years). It was also decided to implement the mass chemotherapy in a vertical approach on a single day called "National Filariasis Day (NFD)".
* Information Education and Communication (IEC) for enlisting co-operation of people and participation for the MDD.
* Management of acute and chronic filariasis through referral services at selective centres.

Table 5 : Epidemiological situation of filariasis in 13 districts selected for mass annual single dose DEC as a pilot project.*

State	District	Year	mF Rate	Disease rate	Average endemicity
Andhra Pradesh	East Godavari	1983	16.70	8.90	25.60
	Srikakulam	1956	13.90	4.10	18.00
Bihar	Darbhanga	1958	4.50	16.30	30.80
	Siwan	1982	2.29	4.87	7.16
Kerala	Alappuzha	1975	13.40	8.20	21.60
	Kozhikode	1960	9.28	5.66	14.94
Orissa	Puri	1993	10.60	NA	10.60
	Khurda	1958	4.51	5.00	8.96
Tamil Nadu	South Arcot	1958	12.90	7.60	20.50
	Vellore	1958	9.63	6.20	15.60
Uttar Pradesh	Gorakhpur	1962	6.65	11.84	18.49
	Varanasi	1958	10.80	10.10	21.00
West Bengal	Puruliya	NA	NA	NA	NA

* compiled from published reports and literature by Dr. S.Sabesan, VCRC, Pondicherry.
NA, not available.

While the State governments will implement the strategy, technical assistance, review and monitoring and evaluation will be done by NICD, Regional offices of Ministry of Health, Indian Council of Medical Research (ICMR) and concerned State Health Authorities. In the selected districts, the ongoing NFCP programme should be continued in the urban areas as before, in addition to annual MDD. The revised strategy is being implemented on pilot scale in 13 highly endemic districts distributed in 7 states (Table 5), and

the major focus is on NFD. The programme has undergone a mid-term review in early 2000 and the major challenge is to increase the compliance rates, through appropriate community IEC.

TOWARDS ELIMINATION OF FILARIASIS

India is committed to elimination of filariasis as she is a signatory to the WHA resolution on the same in 1997. However, India should consider this as a priority in its health agenda as she alone contributes to about 40% of the global population at risk of infection (Michael *et al.*, 1996). In leading to achieve the goal of elimination, India can prevent huge annual economic loss of about 1.5 billion $ (Ramaiah *et al.*, 2000b). The possibility of elimination of filariasis in India is high as man is the only primary host for lymphatic filariasis. India has a long standing experience in filariasis control, the necessary health infrastructure (up to village level) and support of technical and research expertise. She also has the valuable experience of launching several other health programmes such as universal immunization and pulse polio, which will of help in optimizing large scale control of filariasis. The need of the hour is to spell out the elimination policy and strategy, implement the same earnestly and learn from the experience by proper monitoring and evaluation. This elimination strategy should be developed based on all progress made in our current understanding and knowledge of the disease and its control. Further, it should not depend solely on any one method of intervention but should consider more than one type of intervention, depending on the site-specific realities.

Our current knowledge on these research findings is outlined below :

- There has been considerable progress in our understanding of social and economic burden of filariasis to individuals, communities and nation, thereby the need for undertaking control operations (Ramu *et al.*, 1996; Ramaiah *et al.*, 1996; Ramaiah *et al.*, 1998; Ramaiah *et al.*, 1999, 2000a; Ramaiah, 2000). Burden of filariasis is also expected to be more due to clinical syndrome such as renal damage (Dreyer *et al.*, 1992).

- Rapid Assessment Procedures (RAP) to measure the prevalence of filariasis in an endemic area have been developed for delimiting filariasis endemic areas (Gyapong *et al.*, 1996; Ramaiah *et al.*, 1996a; Pani *et al.*, 1997a).

- Rapid geographical assessment of bancroftian filariasis (RAGFIL) procedure for rapid delimitation and stratification of filariasis endemic areas has been developed (WHO, 1998).

- DEC as single annual dose is shown to be safe and effective drug for mass consumption for the control of filariasis (Ottesen *et al.*, 1997; Subramayan Reddy *et al.*, 2000; Das *et al.*, 2000). Primarily, DEC is a microfilaricidal drug but also known to kill up to 50% of the adult worms (Ottesen *et al.*, 1997; Gerusa Dreyer, personal communication).

- Morbidity control-foot hygiene has been found effective in the prevention of ADL attacks (Ottesen *et al.*, 1997; Pani and Lall, 1998).

- Vector control has sustained long-term effect, hence it can be an integral part of comprehensive filariasis control programme (Das, 1998). In situations where transmission interruption is not possible through mass chemotherapy, vector control becomes very important. It can be made cost-effective by spatial and temporal targeting, limited to specific areas and season (Appavoo *et al.*, 1999).

- New simple diagnostic tools (ICT, OG4C3 and DNA probes) are being available (Chanteau *et al.*, 1994 1994a; Weil *et al.*, 1997; Ottesen *et al.*, 1997; Pani *et al.*, 2000). These will be of value to evaluate the success of chemotherapy programmes directed towards the parasite in humans.

- Newer mathematical models (LYMFASIM and EPIFIL) are being developed and validated and these will be useful for monitoring and evaluation of control programmes and prediction of the epidemiological trends in infection and disease (Chan *et al.*, 1998; Plaisier *et al.*, 1998).

- Newer implementation mechanisms are being formulated and evaluated. These include the feasibility of drug delivery by community. through primary health care approach or through partnership approach. The partnership approach is being evaluated in Pondicherry urban area. The partners include different local governmental (social welfare, health and family welfare, state unit of NFCP, Department of Information and Publicity), central government departments (All-India Radio-AIR and Television Broadcasting Department, Doordarshan), student volunteers (national service and Mahila sangam. M/S Burroughs Wellcome have supplied DEC free for this annual single dose mass chemotherapy programme. This is a good example of site-specific strategy developed locally (Annual report, VCRC, 1998).

Intervention choice for elimination

The choice of the appropriate method (s) of intervention depends upon the prevalence of infection, disease and transmission pattern for a given unit of intervention. There are two primary intervention designs, transmission control and morbidity control, used either alone or in combination. In fact, based on stratification, one could decide the choice of intervention (s) in different phases of elimination for different strata.

TRANSMISSION CONTROL

Transmission control aims at interruption of transmission by either of the following methods:

- Parasite control
- Vector control
- Reduction in man-vector contact.

Parasite control : It is primarily targeted for reduction in parasite load in human community leading to reduction in transmission, with subsequent reduction in appearance of fresh cases of infection and finally reduction in morbidity in long-term (Ottesen *et al.*,1997; Appavoo *et al.*,1999). DEC has been the drug of choice for the past four and half decades and continues to be so even today (Sharma *et al.*, 1995). Ivermectin, a new macrolide compound has also been found to suppress microfilaraemia rapidly. The efficacy of combination of both the drugs has been found superior than either of them (Das *et al.*, 2000; Ramaiah *et al.*, 2000b). However, ivermectin is not available commercially in India at present and there is no idea as to its probable cost. In view of this, DEC has to be the main source of chemotherapy for the elimination strategy in India. There are several modes of mass community based interventions with DEC, such as :

- selective therapy of detected parasite carriers (6mg/kg/day for 12 days, given daily/weekly/monthly)
- mass annual single dose of DEC (6mg/kg)
- mass spaced monthly or semiannual single dose of DEC (6mg/kg)
- distribution of DEC medicated salt (0.2 gm%) to entire community at risk (Subramanyan Reddy and Vengateswarlou, 1996).

Under the current national programme in India, DEC is distributed to parasite carriers by the daily selective therapy method (first of the above list), after detection of carriers by night blood examination. Although, it has resulted in reduction in parasite prevalence in the areas covered, the night survey for parasite detection is cost-prohibitive, has low acceptability both by the community and programme managers, and finally it is not pracitical to extend to larger rural areas (Srividya *et al.*,2000). Technically, it is also not very sound, since many of the infected individuals cannot be detected by the technique employed (Rani and Dhanda, 1994). Currently, the most practical and feasible method is mass annual single dose of DEC and this is being attempted as a new initiative in a pilot programme (Das *et al.*,1999a,b). However, one of the important challenges that needs attention is to be able to decide the duration of this annual intervention. This will depend upon the level of endemicity, vector and human population density and the effective coverage of target population achieved. The opportunities to decide this arise out of the data collected under the pilot projects and application of mathematical models by trend analyses. Again, the most practical approach is to initiate action in highly endemic localities and learn from practical experience.

Vector control : This is another means of transmission control, targeting either against :

- immature larval stages using chemical, biological tools or by environmental modification
- adult mosquitoes by using chemical insecticides.

In India, larval control is being routinely carried out in the urban areas covered under the programme. It has apparently become costly, since it is carried out routinely, without consideration of the vector seasonality and other factors.

The observation that inspite of decrease in the community cumulative microfilarial load by using mass chemotherapy, effective reduction in transmission parameters need not result, if the vector density in the community remains high (Das *et al.*,2000). Therefore, vector control should be carried out particularly prior to or during peak transmission season, so that the effects of chemotherapeutic measures (which should also be done just before transmission season) are consolidated. In view of this, focal, seasonal vector control will be required in certain specific areas, and should be considered important component of the elimination strategy.

MORBIDITY CONTROL

Classically, filariasis results in acute ADL, lymphoedema leading to gross elephantiasis and hydrocele. It has been shown recently that a majority of the asymptomatic parasite carriers suffer from varying degrees of lymphatic damage (Witte *et al.*, 1993; Freedman *et al.*, 1994; Suresh *et al.*, 1997), which could progress to ovret lymphoedema. Prevention of progression of infection to disease and episodic ADL attacks will not only be important from the view point of reducing morbidity but also increase the acceptance of the overall programme implementation. Morbidity control/ management should, therefore, form an integral component of the elimination strategy. Opportunities for incorporation of morbidity management in the elimination programme arise from recent progress in our understanding of disease process. The frequency of these attacks increases with progression of disease through stages (Pani *et al.*, 1990; Pani *et al.*,1995; Pani and Srividya, 1995; Ramaiah *et al.*, 1996). Due to the functional blockade in lymph flow, secondary bacterial invasion, particularly with Beta haemolytic *Streptococci* results in acute inflammatory ADL (Grace *et al.*, 1932; Liu *et al.*, 1964; VCRC, 2000). It has also been shown that repeated skin injury and ulceration of the oedematous part, predispose ADL attacks. The following measures are currently suggested:

- For prevention of ADL attacks, foot care/hygiene (Shenoy *et al.*,1995; Pani *et al.*, 1997) and use of antibiotics, particularly long acting penicillin (Pani *et al.*, 1997; Pani and Lall, 1998).
- For reduction or arrest of progression of lymphoedema, monthly courses of DEC (6mg/kg/day in 3 divided doses) and community based physiotherapeutic measures including manual massage (Pani *et al.*, 1997; Pani and Lall, 1998).

Several other activities need to be carried out, if India has to move towards its goal of filariasis elimination. The political will shown by India by becoming a signatory of the WHA resolution 1997, needs to be strengthened by demonstration of technical will. Towards this, the Government of India and the States should spell out the policy statement on filariasis elimination. This should be followed by the preparation of national, state and district level strategic plans. Resource mobilization for the implementation of these strategic plans and for appropriate monitoring and evaluation will be the next challenge. This requires a partnership approach at all levels. Operational research need to be carried out concurrently on several issues viz., development of advocacy and IEC materials and mechanisms; intervention, implementation mechanisms; operational feasibility; cost effectiveness/benefit of strategies; rapid, specific, sensitive and affordable monitoring and evaluation procedures (of process and efficacy of intervention strategies); community (consumer) and provider's perceptions, acceptability of the elimination strategy etc.

FILARIASIS ELIMINATION CELL

In view of the activity needs towards filariasis elimination in India, the Indian Council of Medical Research (ICMR) has established a "Cell for Filariasis Elimination in India" at the Vector Control Research Centre, Pondicherry (Appavoo *et al.*, 1999; Das *et al.*, 2000). The cell has to work in close collaboration with the national/state programme managers and other research institutions (NICD, New Delhi and other ICMR and non-ICMR centres) to meet the following objectives:

- to facilitate preparation of a blue-print of the action plan
- to facilitate the formulation of a policy statement and preparation of strategic plan
- to facilitate undertaking advocacy steps at all levels
- to foster effective linkage with all partners
- to facilitate mobilization of resources
- to assist programme managers in the development and implementation of site-specific strategy
- to provide guidelines for monitoring and evaluation of the programme
- to facilitate required training and human resource development
- to facilitate the documentation of the process at all levels, and
- to provide technical information on filariasis and its control to all concerned.

CONCLUSIONS

India alone contributes to about 41% of the global burden of lymphatic filariasis. Although, not a cause of mortality, it is responsible for great economic loss to the nation, apart from being an important cause of physical disability and social burden. The physical, psychological and social sufferings to the patients and families are heart rendering. Yet, it is possible to eliminate this disease because of newer understandings on its epidemiology

and control. There has been considerable progress in our knowledge of the epidemiology and control of the disease, and there are major developments of several decision support tools such as rapid assessment procedures, rapid mapping techniques, day-time diagnostics, mathematical models etc. These can be utilized intelligently for the elimination of this disease. If the political commitment is supported by technical will, partnership approach; national, state and local actions and finally the community will, it will surely be possible to eliminate the scourge of filariasis from the face of India by the target year 2020.

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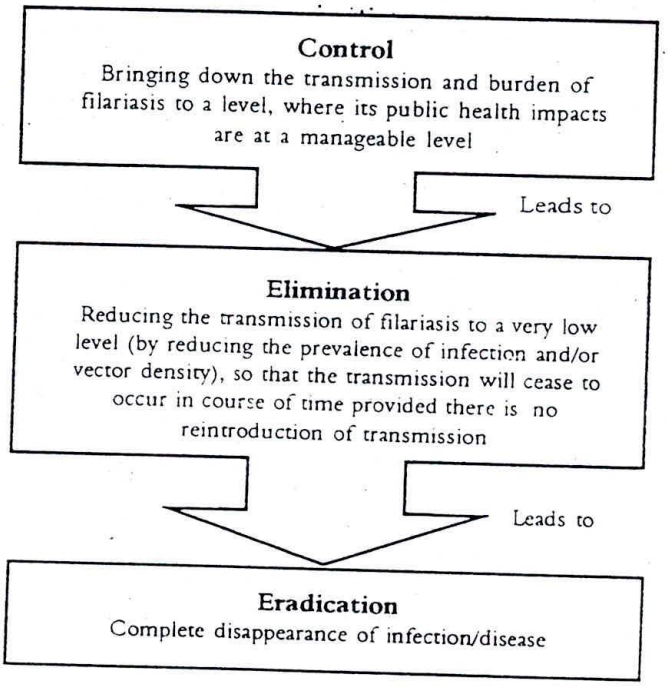
PROSPECTS OF ELIMINATION OF LYMPHATIC FILARIASIS IN INDIA

Lymphatic filariasis is a vector-borne parasitic disease caused by three lymphatic dwelling nematode parasites *viz.*, *Wuchereria bancrofti*, *Brugia malayi* and *Brugia timori*. The disease manifests as progressive lymphoedema leading to disfiguring elephantiasis in both genders, hydrocele — the predominant manifestation in males or loss of respiratory function due to tropical pulmonary eosinophilia (TPE)[1,2]. Filariasis patients suffer from episodic adenolymphangitis (ADL), which causes acute suffering and incapacitation[3,4]. The other health problems due to filariasis include renal disease, arthritis, endomyocardial fibrosis, *etc.*[2,5,6]. Filariasis is considered a hidden disease as lymphoedema is the only visible manifestation and hydrocele, the predominant manifestation in males as also other presentations are not obvious. Filariasis is a disease of the poor and is a cause and effect of poverty. The majority of the people at risk of filariasis live in rural areas. Poor sanitary conditions associated with low socio-economic status of the community make the environment conducive for proliferate breeding of vector mosquitoes facilitating transmission. While year round transmission of filariasis occurs in urban and semi-urban areas, transmission is seasonal in rural areas. The mosquito vectors involved in filariasis transmission include different species of Culex, Aedes, Mansonia and Anopheles in the world[7]. In India, *W. bancrofti* is transmitted by the ubiquitous mosquito, *Culex quinquifasciatus*[8]; and *B.malayi* is transmitted by Mansonia mosquitoes (*M.annulifera, M.uniformis,* and *M.indiana*)[9]. *Aedes* (Finlaya) *niveus* is the vector of subperiodic *W.bancrofti* in Nicobar Islands[10]. Filariasis has been identified as one of the six diseases (among over hundred considered), which could be targeted for elimination / eradication based on considerations that human beings are the only reservoir of infection, diethylcarbamazine (DEC) is an effective drug acting on the parasite (without report of resistance in past 5 decades) and mass annual single dose community drug administration with selective vector control could result in the effective elimination of infection by interruption of transmission[11]. This led to the articulation of the World Health Assembly Resolution for the global elimination of lymphatic filariasis[12]. Based on this, the WHO has called for targeting filariasis elimination by 2020. Since India is the largest filariasis endemic country in the world, the prospects of global elimination of filariasis will very much depend on its success in the Indian sub-continent. This write-up describes the filariasis situation in India, the progress in research in filariasis which has led to the optimism for its elimination; and the major opportunities and challenges ahead in achieving the goal of elimination of filariasis in India.

Division of Publication & Information, ICMR, New Delhi - 110029

The terms elimination, eradication and control need to be understood in proper perspective. The eradication is complete disappearance of infection/disease. Achieving elimination is going beyond control and reaching a situation where eradication is possible[6].



Current Filariasis Situation

According to the estimates made in 1995, globally, there are nearly 1,100 million people living in areas endemic for lymphatic filariasis and exposed to the risk of infection; and there are 120 million cases of filariasis, either having patent microfilaraemia or chronic filarial disease[13]. *W. bancrofti* accounts for approximately 90% of all filariasis cases in the world, followed by *B. malayi* and *B. timori*. *B. timori* is restricted to few islands in Indonesia. India contributes about 40% of the total global burden of filariasis and accounts for about 50% of the people at risk of infection. Recent estimates have shown that out of the 25 states/union territories in India (before bifurcation of states of Bihar, Madhya Pradesh and Uttar Pradesh), for which surveys were carried out, 22 were found endemic for filariasis, and nine states (Andhra Pradesh, Bihar, Gujarat, Kerala, Maharastra, Orissa, Tamil Nadu, Utter Pradesh and West Bengal) contributed to about 95% of total burden of filariasis. A total of 289 districts in India were surveyed for filariasis until 1995; out of which 257 were found to be endemic. In India a total of 553 million people are at risk of infection and there are approximately 21 million people with symptomatic filariasis and 27 million microfilaria carriers. *W. bancrofti* is the predominant species accounting for about 98% of the national burden, widely distributed in 17 states and 6 union territories. *B. malayi* is restricted in distribution, with decreasing trend. An overview of the traditional endemic foci shows concentration of infection mainly around river basins, and eastern and western coastal parts of India (Map)[14].

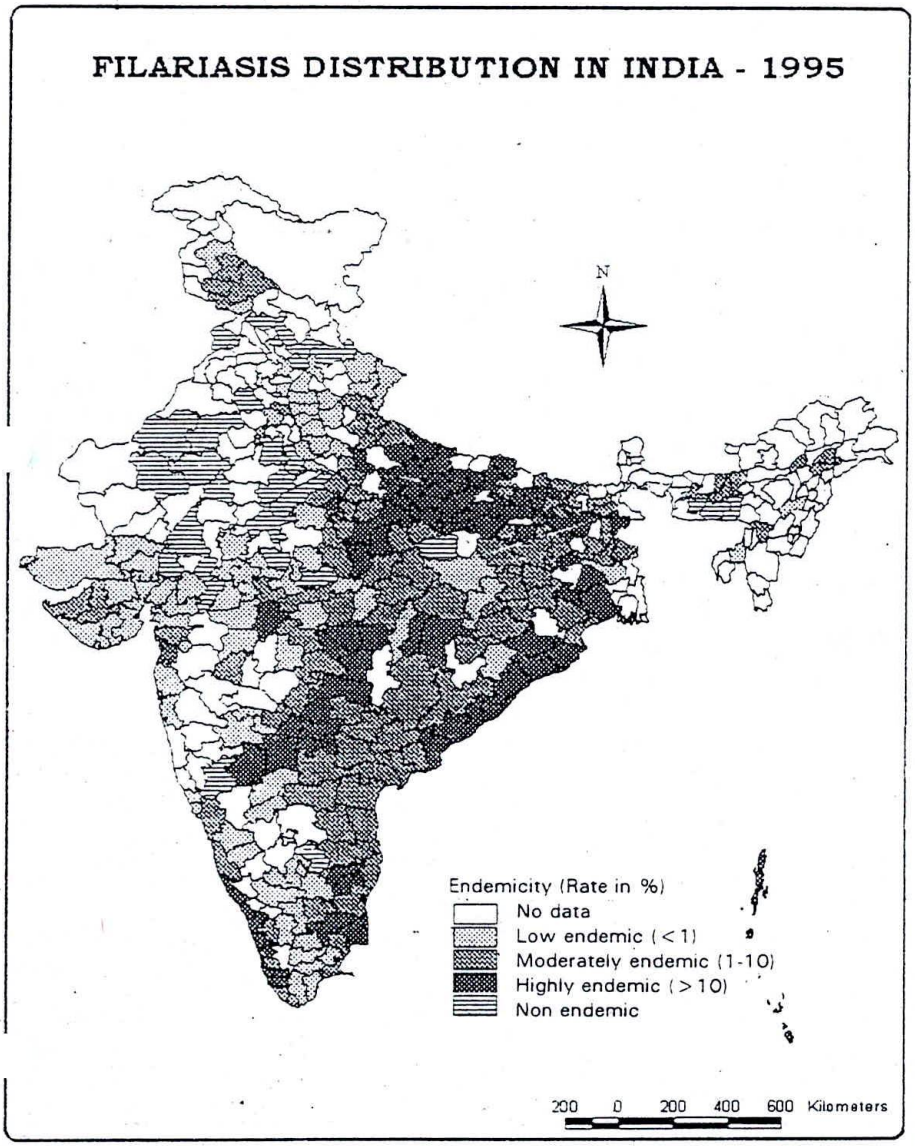
Filariasis Control Under the National Programme in India

A National Filaria Control Programme (NFCP) was launched in India in 1955, based on the pilot scale trials carried out by the Indian Council of Medical Research (ICMR) in Orissa. The Programme has been reviewed from time to time by the ICMR and the strategy modified on the basis of recommendations[8]. Currently, the NFCP covers a population of about 40 million (7% of the population at risk), restricted to urban areas only. The current strategy includes selective chemotherapy (DEC 6mg/kg/day for 12 days) by detection of parasite carriers by night blood survey and larval control of vector mosquitoes. Although this strategy has resulted in the reduction in filariasis prevalence in areas where it has been implemented, it is inadequate for sustained control leading to elimination. The major constraints of the NFCP are that it does not cover the vast majority of population at risk residing in rural areas and that the strategy demands detection of parasite carriers by night blood surveys, which is less sensitive, costly, time consuming and poorly accepted by the community[15]. It is thus pertinent that any proposed elimination strategy should be able to get over these constraints.

Research Findings and Challenges for the Development of Filariasis Elimination Strategy

Socio-economic Burden of Filariasis

Filariasis causes long-term suffering and morbidity as well as high social and economic burden to individuals, communities and the nation[16-21]. Since filariasis is not a direct cause of mortality, it does not get due priority by the planners and policy makers. It has been estimated that the annual economic loss due to filariasis is close to 1 billion US $(approximately Rs. 5000 crores) for the country [20]. Estimation of the socio-economic burden of the disease is important not only to understand the burden



on individual patients and their families, but also for providing information crucial for developing advocacy material for mobilization of resources and commitment for its control. As the estimates made so far are based on limited surveys, it is necessary to workout the national burden of filariasis using appropriate indicators (like Disability Adjusted Life Years – DALY, Quality Adjusted Life Years – QUALY and others) in order to compare the burden across the diseases to facilitate the planners to prioritize diseases for control. These findings will be useful in setting up priority for filariasis against other diseases, preparation of advocacy materials for resource mobilization, generation of political will, sensitization of policy makers, planners, programme managers, media and the community (consumers) to accept the programme and create a felt need for compliance.

Filarial Disease and Pathogenesis

Morbidity management/control is an important component of filariasis elimination. It is essential to understand the disease spectrum and pathogenesis in order to develop appropriate morbidity management strategies. Filariasis results in hidden infection; as most asymptomatic carriers have sub-clinical lymphatic damage[22] and hydrocele, the predominant manifestation of bancroftian filariasis[23] is also not revealed normally, unless it results in gross scrotal enlargement. Children show high prevalence of filariasis antigeneamia[8,24] making them important target for intervention.

Recurrent attacks of episodic adenolymphangitis result in progression of chronic lymphoedema from early reversible to late elephantiasis[1,23,25]. Thus prevention of acute disease will not only bring down the suffering of patients, but also check progression of lymphoedema to disfiguring stages. Bacterial infections, particularly due to beta haemolytic streptococci are important in the causation of acute episodic ADL attacks[26]. In filarial lymphoedema, there is progressive persistent inflammation (chronic dermatitis) as a result of invasion of bacteria in the skin. Parasite *per se* has little role if any, in the skin changes[27,28]. These observations are essential to formulate strategy for morbidity prevention, development of principles of disease management, empower the diseased persons for self help and develop modalities for networking healthcare facilities by strengthening the existing filariasis clinics through training (human resource development) and modernization of treatment facilities for individual patient care leading to enhanced community acceptance of the elimination programme.

Diagnostics

Diagnosis of filariasis is important for programme managers for situation analyses, for monitoring and evaluation of intervention measures; and for physicians in case detection and treatment/management. The problems related with the method of night blood smear examination, used under the current NFCP have already been highlighted. A need has been felt for the development of rapid, specific, sensitive and reproducible diagnostic methods for field application for the detection of infection (microfilaraemia or adult parasites) both in humans and in vector mosquitoes. A rapid day blood immuno-chromatographic card test (ICT) for detection of infection, developed elsewhere[29] has been found highly specific and more sensitive in India also in comparison with the night blood smear examination[30]. Although it is costlier, it has the advantage of on the spot day blood detection of parasite carriers in large numbers (compared to the night blood smear examination). By appropriate sampling design, if the sample size could be minimized, it can be useful for the detection of infection in individuals or for delimitation of areas or for evaluation of interventions. The antigeneamia detection has been recommended for certification of elimination by using a lot quality assurance sampling (LQAS) design[31-32]. The other newer diagnostics include Og_4C_3 antigen assay in human whole blood and sera[30] and DNA probes for infection detection in vector/man[33-36].

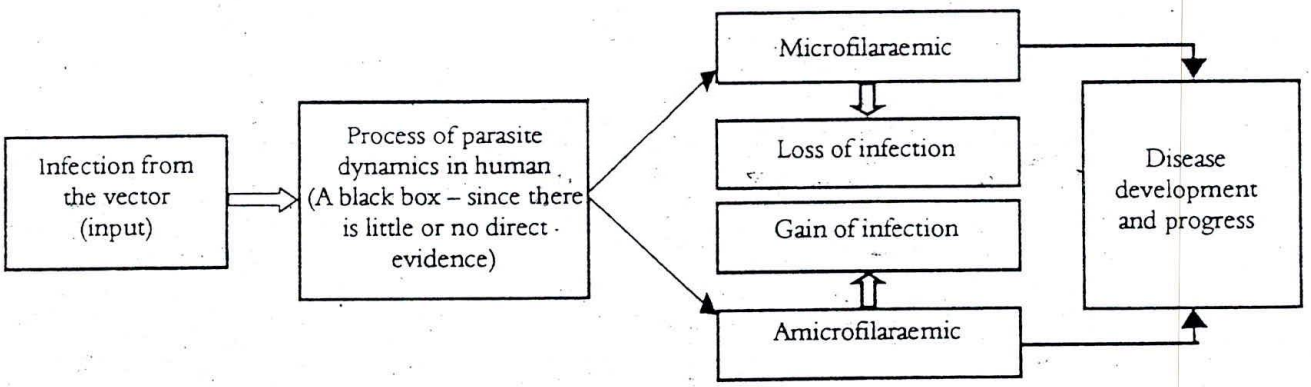
Currently the vectors are collected and dissected manually for entomological parameters. Thus rapid and sensitive methods are necessary for overcoming these difficulties. A mosquito collection trap has been developed[37] to overcome the problem of manual collection. The challenge ahead is in proper operationalization of these diagnostic and collection techniques in large-scale control programmes.

The development of new diagnostic tools are useful for the rapid detection of endemic areas and mapping, monitoring and evaluation of interventions, sensitive tests such as ICT kits are useful for rapid verification of attainment of end point of elimination through cost-effective sampling designs. However, there are challenges to be addressed which include identification of parasite stage specific diagnostic tools, methods to sample vector population for xenodiagnosis and simple and cost-effective methods of rapid detection of endemic areas.

Decision Support Tools

Tools for decision support are crucial for the programme managers. Considerable efforts have been made in the development of these in the past decade. Rapid assessment procedures (RAPs) to measure the prevalence of filarial disease/infection in an area have been developed and found useful for delimiting filariasis endemic areas[38]. Physical examination of adult males by trained health workers is most useful to assess the hydrocele prevalence. Methods for rapid epidemiological mapping of filariasis (REMFIL) for rapid delimitation and stratification of filariasis endemic areas using grid sampling procedure have become available using fixed grid sampling of 25 kms[39-40]. However, it is necessary to optimize the size of the grid or to develop alternate sampling designs in order to get the real situation of the distribution of filariasis. The filariasis distribution map of India developed on GIS platform using historical database (NFCP and other published data) may be useful in prioritizing areas for intervention[14].

Mathematical models have been developed to predict the epidemiological trends of infection and disease and the effect of interventions and these models are based on the following conceptual framework:



Mathematical models are important for diseases like filariasis where several aspects of dynamics of infection, transmission and disease make the predictions of intervention measures difficult. The models provide a tool to solve several of these questions for which direct measurements cannot be done. Parameter estimations *viz*.estimation of fecundic life span of parasite[41], understanding the progression of infection and disease through stages, and understanding the distribution of infection and disease at household and community level (clustering phenomenon) are important outcome of development of mathematical models. Models are also useful for prediction of outcome of different intervention measures in different endemic/epidemiological situation.

Two mathematical models namely EPIFIL and LYMFASIM developed by the Vector Control Research Centre (VCRC), Pondicherry in collaboration with Oxford University, UK and Erasmus University, Rotterdam respectively are being validated and refined under the field conditions. These models can be used as a decision making tool to select intervention(s) and plan implementation strategies. These can also be used to monitor and evaluate various intervention options[42-44] as a feedback to the programme. A management information system (MIS), which is essential for the programme managers at different levels is also being developed by the VCRC which is expected to be an important decision support tool for situation analysis and for taking corrective measures, so that the intervention reaches the target. Establishment of an idemiological information system will be useful for rapid dissemination of data and information on key indices. This web based information system and database can be used as a rapid feedback by programme managers and also for planning/replanning intervention measures as well as for monitoring/taking mid course corrective measures. The VCRC has established a website www.pon.nic.in/fil-free for this purpose.

Intervention Tools and Strategies

For filariasis control/elimination, intervention tools are directed either towards transmission control (by targeting parasite and/or vector) or morbidity management for preventing disease progression and reduce morbidity.

Transmission control

Mass drug administration

Mass annual single dose treatment with either a single drug (DEC or ivermectin) or in combination with albendazole is recommended for filariasis control/ elimination. Use of DEC fortified salt is another intervention recommended for filariasis control. These drugs reduce parasite load in the community thereby reducing the number of parasites available for the vector population. Consequently, transmission is reduced and hence these measures are considered as transmission control tools. Single dose of DEC, ivermectin or albendazole, and co-administration of DEC either with ivermectin or albendazole in microfilaria carriers has been found to be safe and effective in reducing microfilaria intensity at the end of one year in hospital based studies[45-49] (table I). The tolerability and efficacy of drugs and their co-administration were not significantly different between genders and were independent of age. However, the adverse reaction score for albendazole was much less than the other drugs. These results and other community level trials[50,51] suggest the utility of mass single annual and semiannual dose of DEC in the transmission control. The evaluation of the impact of mass drug administration (MDA) with DEC or ivermectin or both on transmission of bancroftian filariasis is being carried out by the VCRC. The results show that DEC is as effective as ivermectin in drastically reducing the levels of transmission after six successive rounds of mass administration. Four rounds of co-administration of DEC with ivermectin resulted in reduction in the levels of transmission comparable with the six rounds of individual drugs, indicating that the two drugs together are better compared to any single drug. Complete interruption of transmission was not achieved in any of the trials, indicating that six rounds of single drug or four rounds of co-administration of both the drugs are not adequate for achieving elimination[52,53]. These also suggest that dependence on any single method of intervention is not realistic to achieve the desired results. Interruption in the transmission of filariasis was also possible with DEC medicated salt[54-55], although there are many operational problems relating to the distribution mechanisms and community acceptance of DEC medicated salt in different parts of India. To enhance the effect of mass annual single dose treatment, it is essential to identify methods to enhance coverage of drug distribution and community compliance.

Table I. Comparison of efficacy and tolerability of single dose DEC, ivermectin or albendazole alone or i combination on prevalence and intensity of mf of *W.bancrofti* carriers in Pondicherry.

Drug	Dose (Single)	No. of carriers	Adverse reactions		Efficacy (% reduction at 360 days)	
			Incidence (%)	Mean score	Prevalence	Intensity
DEC[47]	6mg	29	65.5	0.5	8.3	83.7
DEC*	12mg	20	85.0	1.8	52.6	99.5
Ivermectin[47]	400μg	30	93.3	1.5	34.8	97.0
Albendazole[47]	400mg	19	42.1	1.8	26.3	9[illegible]
DEC+Ivermectin*	6mg+200 μg	20	90.0	5.6	60.0	99.7
DEC+Ivermectin*	6mg+400 μg	20	100.0	6.7	94.6	99.9
DEC+Albendazole[48]	6mg+400 mg	18	61.1	6.6	27.8	95.4

Superscript nos. refer to the sl no. in the reference list *VCRC, Unpublished data; Dose: DEC mg/kg, Ivermectin μg/kg, Albendazole m

Vector control

Vector control can bring in sustained effect and hence it can be an integral part of comprehensive filariasis control programme. In situations where transmission interruption is not possible through mass chemotherapy alone, vector control becomes very important. It can be made cost-effective by spatial and temporal targeting (limited to specific areas and season)[27,56]. Long-term operational effectiveness of integrated vector management (IVM) strategy for the transmission control of bancroftian filariasis was demonstrated in Pondicherry[5,7-59]. *Bacillus sphaericus*, a bio-control agent in bancroftian filariasis control has shown to be effective in reducing vector density and transmission[60]. The utility of vector control in combination with mass annual treatment needs to be explored. Vector control can be aimed to bring down the vector density below the critical level[27] and this can be achieved through selective vector control.

Morbidity prevention/management/control

As many clinically asymptomatic infected individuals have lymphatic abnormalities, they may be at risk of developing the disease. The DEC treatment in these cases is expected to clear the infection and make them infection free, so that it is expected that the pathology will not progress to overt disease . However, scientific evidence needs to be generated in support of this, and currently this remains more empirical. As already mentioned, th prevention of repeated episodic attacks of ADL will b important not only to prevent sufferings of patients (thu reduce the burden of disease) but also for the preventio of progression of existing chronic disease. Thoug available data suggest that regular foot hygiene prevent incidence of episodic ADL attacks[5,46], there is a need t generate comparative data on foot care versus natura trend of ADL incidence. Co-administration of da[illegible] wit DEC results in significant reduction of filaria lymphoedema[61]. Surgical management of lymphoedem is indicated in certain specific cases, and prevention c acute attacks after surgery is important for sustainin the benefit of surgery.

Operational Issues

Drug delivery mechanisms are important for mas drug administration. Drug delivery by community (calle community directed treatment: COMDT) was compare with the drug delivery through primary health car approach (using the existing health infrastructure) . Th current experience in rural India suggests that th community acceptance of drug delivery through th existing governmental health infrastructure is highe compared to that by other members of the community[2]

A novel drug delivery approach is being evaluate in Pondicherry urban area. The partners in this approac

include different local governmental departments (social welfare, health and family welfare, state unit of NFCP, department of information and publicity), central government departments (All India Radio, Doordarshan), students (NSS) and other local volunteers (*mahila sangam, etc.*), and pharmaceutical company (M/s. Burroughs Wellcome has supplied DEC free for this programme). The VCRC is coordinating the efforts, apart from undertaking the programme evaluation. This is an example of site-specific strategy developed locally[62].

Developing a distribution mechanism for DEC medicated salt is also a challenging task. While in Karaikal urban area, the distribution was primarily through organized efforts of the health department in close collaboration with salt providers (merchants and vendors) and with the able administrative support[54], in Kanyakumari district, the state government is implementing the same through the existing public distribution system (PDS). However, several operational issues relating to manufacture, distribution and community acceptance of the DEC medicated salt need to be addressed.

There is an urgent need for the preparation of advocacy material for intervention programmes. Findings of advocacy research will be useful for sensitization of policy makers and planners to allocate required funds, programme managers to develop sound intervention designs, implementation process and mobilize partners. Advocacy is also important for social mobilization of the community and other important partners (such as politicians, community leaders, medical practitioners and media). Research on this aspect (including development of IEC: information, education and communication material) has already been initiated.

Pilot Scale Intervention Programmes towards Elimination of Filariasis in India

Two important large-scale pilot intervention projects have been launched in India, the results of which will decide the future design of the filariasis elimination programme. The first is the launching of National Filariasis Day (NFD) by the Directorate of National Anti Malaria Programme (for administrative reasons, NFCP forms an integral part of the NAMP, as all vector-borne diseases are addressed under a single Directorate) in 1996. The second is a multicentric study on operational feasibility and impact of co-administration of albendazole and DEC in controlling lymphatic filariasis launched by the ICMR.

The NFD experience

Even before India became a signatory to the WHA resolution on filariasis elimination, the NAMP launched a pilot project of mass drug administration covering approximately 40 million population in 13 highly endemic districts in 7 states in India (Table II). The drug distribution

Table II. Epidemiological situation of filariasis in 13 districts selected for mass annual single dose of DEC as a pilot project under NFD.

State	District	Total population (Milliion)	Year	mf rate (%)	Diseae rate(%)	Average endemicity (%)
Andhra Pradesh	East Godavari	4.54	1983	16.70	8:90	25.60
	Srikakulam	2.32	1956	13.90	4.10	18.00
Bihar	Darbhanga	2.17	1958	14.50	16.30	30.80
	Siwan	2.51	1982	2.29	4.87	7.16
Kerala	Alappuzha	2.62	1975	13.40	8.20	21.60
	Kozhikode	2.76	1960	9.28	5.66	14.94
Orissa	Puri	1.29	1993	10.60	NA	10.60
	Khurda	1.63	1958	4.51	5.00	8.96
Tamil Nadu	South Arcot #	2.15	1958	12.90	7.60	20.50
	North Arcot $	1.32	1958	9.63	6.20	15.60
Uttar Pradesh	Gorakhpur	3.06	1962	6.65	11.84	18.49
	Varanasi	4.86	1958	10.80	10.10	21.00
West Bengal	Puruliya	2.22	NA	NA	NA	NA

NA: Not Available; # Currently named as Cuddalore; $ Currently named as Thiruvannamalai

was to be carried out by observance of National Filaria Day. The DEC tablets in the dose of 6mg/kg body weight were to be distributed according to age (Table III) either by door to door visit or through drug delivery booths on a single day. The entire population of the district excluding pregnant women and infants formed the target population for the drug distribution. Vector control measures and selective chemotherapy were to be continued in the urban areas where the NFCP units were located within these 13 districts. The NAMP was to provide the drugs and money for the IEC component. The coverage of population was to be recorded in the family registers. The states had to prepare macro- and micro-plans, train the health personnel involved, provide additional resources, implement the programme and send report to the NAMP. The local programme implementation, and monitoring and evaluation are to be carried out jointly by the research institutes under the ICMR or the National Institute of Commicable Diseases (NICD), Delhi and the state programme managers.

Table III. Age groups, DEC tablet strength and number of tablets adopted for mass drug distribution in Tamil Nadu (upto 2001)

Age (years)	DEC (dose in mg)	No. of tablets (50 mg)
<1	Nil	Nil
1-2	50	1
3-4	100	2
5-8	150	3
9-11	200	4
12-14	250	5
>14	300	6

Pregnant women excluded

The programme was launched in August 1996, in only South Arcot (Cuddalore) district of Tamil Nadu. In other districts the programme was initiated during 1997-98. The reported coverage of drug distribution in these districts was found to range from 43.8 to 95.0% while consumption was between 12 to 89% in different sites[03]. A mid-term programme assessment was carried out by the NAMP in January 2000. Inadequate coverage in drug distribution and consumption were found to be the major limitations of the pilot project. It was found that supervised consumption was not adhered to. Single day distribution was not found practical. Although the first day coverage was higher, at least 4-5 additional days were required for mopping up. The constraints include inadequate manpower, lack of incentives (particularly in comparison to other community programmes such as pulse polio vaccination), poor community awareness and acceptance, inadequate funds for IEC, mobility, supervision and training. The financial commitment and support to the programme was not uniform in different states and consequently affected the resource allocation and priority settings. The review committee recommended for the continuation of the pilot project for the five rounds in each of these 13 districts and to ensure supervised consumption. The committee further recommended proper monitoring, supervision, timely review, development of site-specific IEC and social mobilization methods and mechanisms, pre-and post-assessment surveys, provision for adequate funds, orientation of medical and paramedical personnel, and other distributors. Reducing the number of tablets for consumption by increasing the strength could be important for overcoming the constraints.

Health being a state subject, the Tamil Nadu Public Health Department launched the NFD programme on its own in 10 additional endemic revenue districts (other than South and North Arcot districts already covered by NAMP) of the state covering 15 health unit districts (HUDs) from 1997 (Table IV). Mass annual drug administration using DEC alone was carried out between 1997 and 2000 in all the 15 HUDs. In 2001, while albendazole (400 mg for all the individuals equal to or above 2 years of age) was distributed along with DEC in 9 of these HUDs, DEC alone was distributed in the remaining 6 HUDs. Considering the difficulties in community acceptance of the age specific drug schedule as implemented under the NAMP project (an adult has to take 6 tablets of DEC of 50mg strength), the Tamil Nadu has revised the drug schedule using 3 age classes by distributing DEC tablets of 100mg strength (1 tablet for 2-5 years, 2 tablets for 5+ to 14 years and 3 tablets for >14 years age group for the subsequent rounds.

Operational feasibility and impact of co-administration of albendazole and DEC

Evaluation of NFD programme has shown that improving the community compliance in DEC consumption is the major challenge. Hypothesizing that it could be improved if the community perceives its benefit co-administration of albendazole with DEC became

Table IV. Coverage for annual single dose of DEC/DEC+albendazole in additional districts of Tamil Nadu.

Revenue district	Health unit district	Total population (million)	Population covered (%) In 5 years					
			1997	1998	1999	2000	2001 @	
							DEC	Albendazole
Kanchipuram	Kanchipuram	1.07	94.0	ND	97.0	97.0	96.6	96.4
	Saidapet	1.89	92.0	ND	95.3	96.6	94.0	94.0
Thiruvallur	Thiruvallur	1.30	94.0	ND	95.2	94.0	97.0	94.9
	Poonamalie	1.43	93.0	ND	96.5	95.2	93.5	92.9
V re	Vellore	1.67	96.0	ND	94.4	93.31	96.0	96.0
	Thirupathur	1.65	95.0	ND	95.3	96.2	97.6	97.3
Nagapattinum	Nagapattinum	2.39	96.0	ND	94.7	94.2	96.0	94.5
Thanjavur	Thanjavur	2.13	96.0	ND	85.4	84.6	87.4	86.9
Thiruvarur	Thiruvarur	1.22	96.0	ND	92.5	94.1	97.2	97.2
Thiruchirapalli	Thiruchirapalli	4.11	95.0	ND	88.0	89.0	99.1	NA
Villupuram	Villupuram	1.45	88.0	ND	90.2	90.7	93.4	NA
	Kalakurichi	1.30	91.0	ND	91.7	94.0	95.0	NA
Pudukottai	Aranthangi	0.6	97.0	ND	96.9	96.7	95.1	NA
	Pudukottai	1.32	94.0	ND	94.8	95.5	93.7	NA
Kanyakumari	Kanyakumari	1.6	90.0	ND	91.5	96.2	95.9	NA

ND = Not done NA = Not applicable
@ In 2001 albendazole was distributed along with DEC in 9 HUDs and remaining 6 HUDs received DEC alone
Source: District Public Health Authorities.

potential proposition by which community compliance can be enhanced through perceived benefit of deworming. In view of this, the ICMR has initiated a study to compare the operational feasibility and impact of co-administration of DEC and albendazole with that of DEC alone at district level. This multicentric study which covers 9 districts for DEC + albendazole and 4 for DEC alone (Table V) is being carried out in the states of Tamil Nadu, Orissa and Kerala. The parameters for process evaluation include (i) reported and assessed coverage of drug distribution; (ii) assessed coverage of drug consumption; (iii) safety in terms of adverse side reaction experience report; (iv) perceived benefits - in terms of experience of expulsion of intestinal parasite; and (v) the cost. The impact is assessed in terms of (i) microfilaraemia prevalence and intensity; (ii) antigeneamia prevalence (ICT card test); (iii) transmission parameters (vector infection, infectivity and intensity); (iv) prevalence and intensity of geohelminths; and (v) prevalence of disease. The first round of drug distribution was implemented in March 2001 in Tamil Nadu and Kerala. The results show that the reported coverage of distribution ranged between 87-100% in Tamil Nadu and 81-86% in Kerala. The assessed coverage of distribution as per the ICMR study was significantly higher in rural areas (65 to 73%) of Tamil Nadu compared to urban areas (40 to 45%). In Kerala these figures were 72 to 82% in rural areas and 57 to 85% in urban areas respectively.

Analysis of data from Tamil Nadu shows a significant positive correlation between drug coverage by distribution and consumption. The gap between population covered and total population is wider than the gap between coverage and compliance (drug consumption on

Table V. Population, endemicity level and coverage of drug distribution in districts included to compare the impact of co-administration of DEC and albendazole with that of DEC alone

Centre	Institution	State	District	Drug	Population (in millions)	Endemicity rate (%)	Reported coverage (%) in 2001	
							DEC	Alb
Bhubaneswar	RMRC	Orissa	Puri	DEC	1.57	10.6	ND	NA
			Balesore	DEC +Alb	1.80	4.5	ND	NA
			Ganjam	DEC +Alb	2.90	24.9	ND	NA
Chennai	TRC	Tamil Nadu	Trichy	DEC	2.44	2.7	96.64	NA
			Kanchipuram	DEC +Alb	2.72	19.3	96.59	96.45
			Vellore	DEC +Alb	3.33	15.7	96.90	93.80
			Thiruvallur	DEC +Alb	2.73	19.2	97.09	94.21
Pondicherry	VCRC	Tamil Nadu	Thiruvannamalai	DEC	2.19	15.6	92.13	NA
			Thanjavur	DEC +Alb	2.14	15.9	87.36	86.87
			Thiruvarur	DEC +Alb	1.18	15.9	97.67	95.15
			Nagapattinam	DEC +Alb	1.54	15.9	100	97.97
Delhi	NICD	Kerala	Kozhikode	DEC	2.80	7.1	85.90	NA
			Alappuzha	DEC +Alb	2.20	21.3	80.80	84.49

Alb: Albendazole; ND = Not done; NA = Not applicable

distribution). Therefore there is a scope to increase coverage (Fig.1a&b). Performance of providers can be improved by training and manpower development. In Kerala the gap between coverage and consumption is

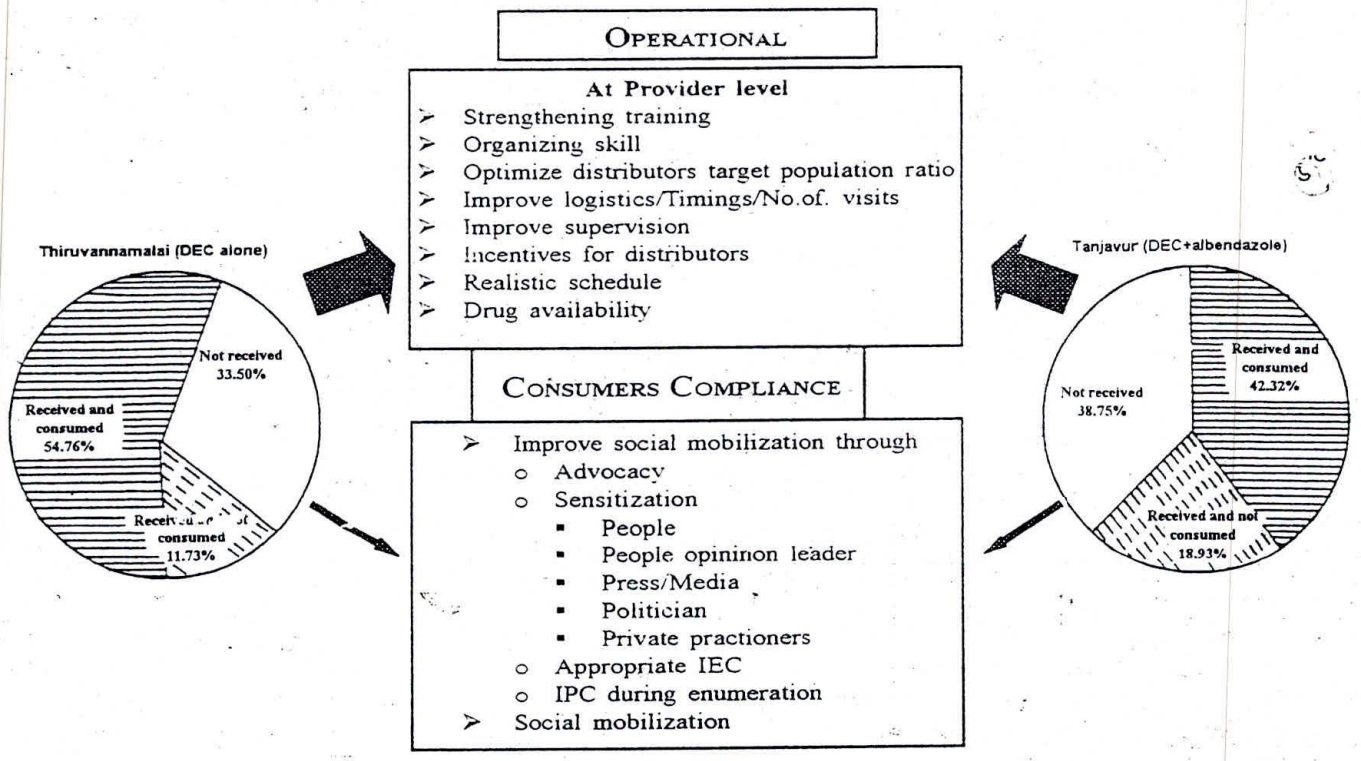


Fig.1a. Recommendations for programme improvement based on the assessed coverage and compliance during the first round of MDA in Tamil Nadu (2001)

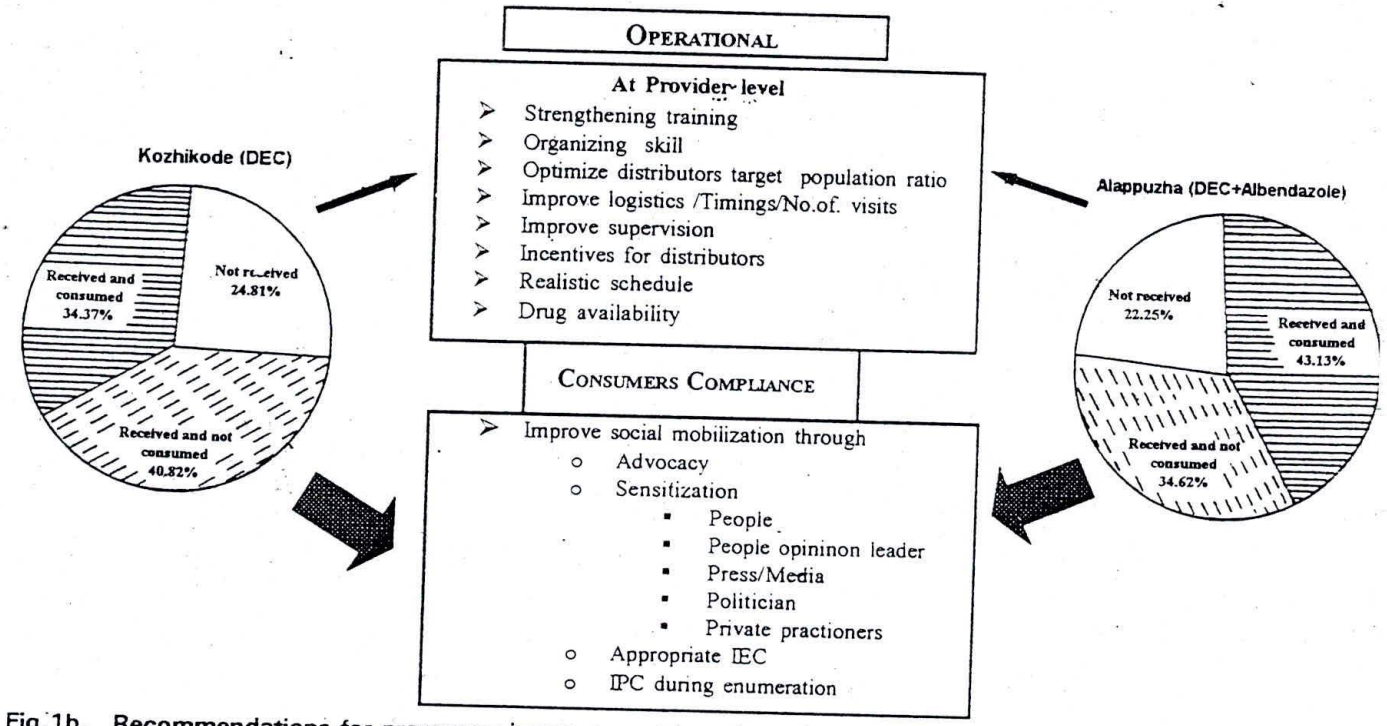


Fig.1b. Recommendations for proramme improvement based on the assessed coverage and compliance during the first round of MDA in Kerala (2001)

wider and therefore efforts are necessary to improve the consumption. This can be achieved by health education and IEC. Being out of station and forgetfulness were the reasons cited for non-receipt or non-consumption of drugs in the districts of Tamil Nadu. In Kerala, the reasons cited for not consuming the drugs were the fear of side reactions and the feeling that drugs were not necessary for the individuals.

The drugs (either alone or in combination) were found safe to administer. The perceived adverse reaction reported in Tamil Nadu was 7% with DEC alone and 12% with DEC+ albendazole. Whereas, in Kerala the reported adverse reaction was less than one per cent of those who consumed the drug(s).

Based on the results of process evaluation, certain changes have been made for improving the drug distribution. This include involvement of volunteers (one volunteer for every 50 houses) to offer achievable target and thereby good coverage of distribution, supervised drug administration to ensure compliance, reducing the number of tablets and treatment class for community acceptance and coverage and limiting drug distribution to one day only to overcome community resistance.

Conclusions

India has shown a political commitment for filariasis elimination by becoming a signatory to the WHA resolution. However, the prospects of elimination will depend on converting the commitment to practical action in the field. These include the articulation of a policy statement, preparation of a blue print of national, regional and local plan of action, social mobilization, generation of necessary funds, effective implementation through a partnership approach, monitoring and evaluation and to progress dynamically by taking evidence based decisions with timely review.

While implementing the recommended control strategy, research in certain areas is also essential to address issues related to monitoring and evaluation, morbidity management and enhance elimination process. This include development of stage specific diagnostics, information on disease pathogenesis particularly lymphoedema and hydrocele, strain variation in relation to response to drugs and clinical manifestations, disease burden estimation, monitoring and evaluation strategies – application and validation of models for incorporation in national control programmes, sampling strategies,

modification and incorporation of other interventions such as vector control and medicated salt along with MDA, optimization of MDA implementation process, modeling of disease dynamics and progression, developing and validating advocacy and social mobilization measures, cost-effectiveness of interventions, defining operational criteria of elimination, setting up of morbidity management centers, rapid mapping and delimitation of areas, policy issues at national and state level, training and man power development, partnership issues – international, regional, national, state, district and local, documentation, utilization of knowledge gained through other control/elimination programmes, methods for dissemination of information including research findings, *etc*.

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ICMR NEWS

The following meetings of various technical groups/ committees of the Council were held:

Scientific Advisory Committee:

Regional Medical Research Centre for Tribals, Jabalpur	May 27-28, 2002

Task Forces (TFs)/Project Review Committees (PRCs)/ Project Review Groups (PRGs) held at New Delhi:

TF on Food-borne Pathogens	May 13, 2002
TF on Medicinal Plants of Western Ghat	May 17, 2002
TF on Immunology	May 20, 2002
TF on Disease Burden due to Leptospirosis	May 20, 2002
PRC on Tuberculosis and Leprosy	May 23, 2002
PRC on Microbiology and Virology	May 30, 2002
PRG Subgroup for Human Reproduction Research Centre Projects	June 11, 2002
PRC on Oncology and Pathology	June 9-10, 2002
TF on Determinants of Functional Status of Older Indians	June 12, 2002

Expert Groups (EGs) and Other Meetings:

EG on National Guidelines for Accreditation, Supervision and Regulation of ART Clinics in India	May 3, 2002 (at New Delhi)
Meeting of Indo-US Joint Group on Environmental and Occupational Health	May 3, 2002 (at New Delhi)
EG on Multicentric Study on Interferon-Glycyrrhizin and Interferon-Ribavirin Combination Therapy in the Management of Chronic Hepatitis C	May 6, 2002 (at New Delhi)
Advisory Committee on Cancer Research	May 14-15, 2002 (at New Delhi)
Meeting of Principal Investigators on Intervention Programme for Nutritional Anaemia and Haemoglobinopathies amongst Some Primitive Tribal Populations of India	May 28-29, 2002 (at Valsad)
Toxicology Review Panel of ICMR	June 28, 2002 (at New Delhi)
Monitoring Committee on Phase III Clinical Trial for Intravasal Injectable Male Contraceptive (RISUG)	June 28, 2002 (at New Delhi)

REVISED STRATEGY FOR THE CONTROL OF LYMPHATIC FILARIASIS IN INDIA

Report and Recommendations of the WHO Sponsored Workshop

New Delhi, 4 and 5 January 1996

सत्यमेव जयते

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NATIONAL MALARIA ERADICATION PROGRAMME
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Ministry of Health & Family Welfare, Govt. of India

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CONTENTS

	Page No.
Foreword	1
Executive Summary	3
Proceedings of the Workshop	5
Inaugural Session	5
Filariasis Problem: Global Scenario	7
Recent Advances in Filariasis Control	8
Operational Research in Filariasis	9
Filariasis Problem in India and the Control Strategy	10
Review of Ivermectin Field Trials in India and its prospects in the National Programme	11
Proposed strategy for Control of Filariasis	13
Communication Strategy for Revised Filariasis Control	14
State's Proposed Plan for Revised Strategy	
Andhra Pradesh	15
Bihar	15
Kerala	16
Orissa	16
Tamil Nadu	16
Uttar Pradesh	17
West Bengal	17
Group Discussions	
Group - I: Single dose DEC Mass Therapy & Case Management	18
Group - II: IEC and Development of Proformae for Monitoring	20
Recommendations of the Workshop	23
Appendices	
1: List of Participants	27
2: Programme of Workshop	30
3: Document on Revised Strategy for Control of Filariasis in India	32

Dr. K.K. DATTA
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(स्वास्थ्य सेवा महानिदेशालय)
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D.O. No _____
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FOREWORD

Lymphatic Filariasis continues to be a major vector borne public health problem in India, with the country contributing to 38% of the global bancroftian and 20% global brugian filariasis problem. It is estimated that India now has 20 million people suffering from chronic filariasis and 27 million micro-filaria carriers. A population of 412 million is exposed to the risk of filariasis in India. Though the National Filaria Control Programme (NFCP) primarily based on anti-larval measures and selective chemo-therapy in urban areas is in operation over four decades no significant reduction in filariasis had been achieved.

However, global research in the control of filariasis have now made available operationally feasible and cost effective technologies for the effective control of lymphatic filariasis and the disease has now been recognised amongst the six potentially eradicable diseases by the "International Task Force on Disease Eradication". This is only possible if the necessary political will and resources for the Filaria Control Programme are available. The National Institute of Communicable Diseases in collaboration with the National Malaria Eradication Programme organised this workshop for revising the National Filaria Control Programme in light of the modern technologies and recommended the administration of a single annual dose mass chemo-therapy through observance of a National Filaria Day along with better management of patients of lymphatic filariasis.

I hope that the Government will consider the recommendations of the experts and make necessary resources available for observance of the National Filaria Day which will help in reducing the human suffering caused by this disease.

We are grateful to be World Health Organisation for their financial and technical support and to the Indian Council of Medical Research and State Governments who made their experts available for this workshop.

(K.K. DATTA)

REVISED STRATEGY FOR THE CONTROL OF LYMPHATIC FILARIASIS IN INDIA

EXECUTIVE SUMMARY

A two day WHO sponsored workshop to formulate guidelines for a revised strategy for the control of lymphatic filariasis in India was organised on 4th and 5th January 1996 at the National Institute of Communicable Diseases (NICD), Delhi jointly by NICD and the Directorate of National Malaria Eradication Programme (NMEP). A total number of 52 experts from WHO, Central and State organisations participated in the workshop. Special topics pertaining to 'Filariasis' were deliberated by the national and international experts. The representatives from seven endemic States presented the proposed plan of activities for the revised strategy.

The new strategy is recommended to be implemented starting from 1996 in view of the success achieved by four endemic countries namely Japan, Taiwan, South Korea and Solomon Islands in the elimination of filariasis. Single dose Diethylcarbamazine (DEC) mass therapy was found to be equally effective compared to the 12 day "standard" therapy in clearing microfilaria from blood. The single dose regimen has the advantage of lesser side effects, better public compliance, decreased delivery cost as the cost of detection of each case is avoided and is feasible to implement through the exishng Primary Health Care system. The new strategy will comprise of the following four components:

1) Single dose DEC mass therapy at a dose of 6 mg/kg body weight once a year

2) Management of acute and chronic filariasis through referral services at selective centres,

3) IEC for inculcating individual and community based protective and preventive measures for filaria control and

4) Continuation of anti-vector measures in all NFCP towns as an adjunct to single dose DEC mass therapy and the microfilaria carriers detected in filaria clinics

The revised strategy is proposed to be taken up in 13 endemic districts covering a population of 40.91 million in the first year which will be extended to 412 million endemic population (303 million rural and 109 million urban) in all the 18 endemic States/UTs by 1998. The 13 endemic districts identified for initiation of the revised strategy in 1996 are East Godavari and Srikakulam in Andhra Pradesh; Darbhanga and Siwan in Bihar; Alappuzha and Kozhikode in Kerala; Khurda and Puri in Orissa; North Arcot and South Arcot in Tamil Nadu; Gorakhpur and Varanasi in Uttar Pradesh; and Purulia in West Bengal.

It is proposed to observe a 'National Filaria Day' on 5th August every year for successful implementation of single dose DEC mass therapy. A high profile social mobilisation through IEC programme is to be implemented through mass media, print media, inter-personal communication, etc., to generate community acceptability.

It is recommended that the Government of India procure DEC and supply to the States as per the calendar of activities spelt out in the revised strategy document. Under the Central share of

expenditure, the following components are to be borne during the first year of the revised strategy (i) Cost of DEC tablets: Rs. 1.75 crores (ii) IEC: Rs. 2.05 crores @ Rs. 5 lakhs per million population and (iii) Petrol, Oil & Lubricants (POL): Rs. 0.26 crores @ Rs. 2 lakhs per district. Besides these three components, Govt. of India may also take up training of medical professionals for proper management of acute and chronic manifestations including the latest surgical methods at selected medical institutions actively involving the Indian Council of Medical Research in collaboration with WHO and other bilateral agencies.

The State governments may bear under their share, the expenditure on: (i) Operational Cost (ii) Cost of drugs (other than DEC) like antibiotic, anti-pyretics and anti-fungal agents for case management (iii) 15% share of IEC, (iv) Cost of transportation (excluding POL expenditure).

The revised Strategy will be periodically monitored and reviewed through a network of institutions identified in each State. Independent appraisal of the progress of the revised strategy is also proposed. It was unanimously recommended by the participants to entrust the implementation of the revised strategy to the National Institute of Communicable Diseases in view of its past experience in the successful implementation of the Small-pox Eradication Programme and the National Guinea Worm Eradication Programme. The proceedings and recommendations of the workshop are detailed in the document. The revised strategy for the control of filariasis in India is given in Appendix - 3.

PROCEEDINGS OF THE WORKSHOP

A two day workshop to formulate the revised strategy for the control of lymphatic filariasis in India was organised on 4th and 5th January 1996 jointly by the National Institute of Communicable Diseases (NICD), and the Directorate of National Malaria Eradication Programme (NMEP) with financial assistance from the World Health Organisation. The workshop was attended by the experts from WHO, Geneva, WHO-SEARO, New Delhi, representatives from seven endemic States, Indian Council of Medical Research, Central Health Education Bureau, Indian Institute of Mass Communication and Directorates of NICD & NMEP (Appendix-1).

National and International experts in the field of filariasis after highlighting the magnitude of the global and Indian problem of lymphatic filariasis, deliberated on the recent advances made in the area of control of lymphatic filariasis. Representatives of the state governments, who had earlier been given a working document on the revised strategy for the control of filariasis, proposed their plan of action for the revised strategy in the identified districts for the first year. The participants then had in-depth workshop in two sub-groups to propose an action plan as per the terms of reference. The group's recommendations were discussed in length and a comprehensive plan for the revised strategy has been prepared. The programme of the Workshop is given in Appendix-2.

INAUGURAL SESSION

Dr. K.K. Datta, Director, NICD while welcoming the distinguished participants, experts and invitees, emphasised the urgent need to revise the strategy for the control of filariasis in India in view of the newer control strategies which have yielded successful results in other countries. However, before extending the revised strategy on a nation-wide basis he advocated that the new strategy be implemented on a pilot basis in selected endemic districts in the initial year which could then be extended to all other endemic districts in the country in a phased manner. He requested the participants to formulate a pragmatic and cost-effective strategy suitable to Indian conditions for eliminating the age old scourge inflicting the population in India.

Dr. Gautam Biswas, Deputy Director, NICD enumerated the objectives and methodology of the workshop highlighting that the new strategy should encompass the three pronged attack on the disease with single annual mass administration of DEC, case management to reduce morbidity and community based prophylactic measures as an integral part of the entire control strategy.

Dr. R.S. Sharma, Director, National Malaria Eradication Programme in his address traced the prevalence of filariasis in India to the famous Indian physician Susruta in 600 BC in his treatise 'Susruta Samhita'. He said that filariasis being one of the important public health problems in India second only to malaria, should be accorded due priority for its control. He remarked that the new strategy could be implemented through the existing health care delivery infrastructure of the country. He said that integrated health care approach supplemented by the concerted efforts of Non-Governmental Organisations should be able to yield the desired results when the new strategy for the control of filariasis would be implemented.

Dr. Prema Ramachandran, Adviser (Health), Planning Commission, Govt. of India mentioned that the Planning Commission was well aware of the magnitude of lymphatic filariasis in India and assured that the Commission would consider positively the funds for the revised strategy for the control of filariasis.

Dr.V.S. Orlov, Senior Regional Adviser, (Mal & VBC) WHO-SEARO expressed that he was encouraged to note that India would soon be revising the strategy for the control of filariasis, and conveyed full support of the World Health Organisation in achieving the goals of Alma Ata declaration.

Ms. Shailaja Chandra, Additional Secretary to the Govt. of India, Min. of Health & F.W. assured that the Govt. of India was fully committed in alleviating the sufferings of the population in the vast areas of India from the chronic manifestations of filaria disease. The Govt. of India would favourably consider for sharing the expenditure with the States in the implementation of the revised strategy for eliminating the filaria infection in the country.

Dr. N.K. Shah, WHO Representative to India, in his inaugural address higlighted that the International Task Force for Disease Eradication has identified lymphatic filariasis as one of only six infectious diseases considered eradicable or potentially eradicable. He said that the time has now come for India to join the global programme to eliminate the disease and was optimistic that the national efforts in India would be successful in achieving this goal. He added that the World Health Organisation in collaboration with UNDP, World Bank and endemic countries would be actively participating in the global strategy for the control of lymphatic filariasis. He complimented the organisers for the timely holding of this workshop. He wished the participants success in their deliberations during the workshop in formulating the new strategy for the control of filariasis in India.

Dr. B.P. Patnaik, Joint Director, NMEP, while proposing a vote of thanks complimented all the States for their participation in the workshop. He thanked WHO for the financial assistance in conducting the workshop and expressed gratitude to Dr. N.K. Shah, Dr. V.S. Orlov, Ms. Shailja Chandra, Dr. Prema Ramachandran and other dignitaries and representatives of States & Research Organisations for attending the workshop. He thanked all the Officers, staff members and consultants of NICD and NMEP for extending their full support in organising the workshop on a successful note.

FILARIASIS PROBLEM: GLOBAL SCENARIO

Dr. C.P. Ramachandran, WHO, Geneva

The estimates of the global prevalence of lymphatic filariasis in 1992 revealed that there were about 72.8 million people with *W. bancrofti* and 5.8 million people with *B. malayi* or *B. timori* infections. Although these estimates have indicated the magnitude of the problem, the data could not indicate the disease problem separately and hence the public health problem of these infections could not be correctly projected. The information with regard to countries of Sub-Saharan Africa was based on very old data. However, recently an attempt has been made for the detailed assessment which has revealed that about 106.2 million persons are now infected with *W. bancrofti* and 12.9 million with *B. malayi* or *B. timori*. Thus a total of 119.1 million are now estimated to be harbouring lymphatic filariasis infection world-wide. The overt physical disabilities from these infections affect about 43 million (40 million with *bancroftian filariasis* and 3 million with *Brugian or timorian filariasis).*

W. bancrofti is prevalent in seven countries in the Americas, four countries in the Eastern Mediterranean Region, eight countries each in south-east Asia, and the West-Pacific Regions and about 38 countries lie in the endemic areas of Sub-Saharan Africa while Brugian infection is prevalent in eight Asian countries. India and Sub-Saharan countries contribute 38% and 34% of the global disease burden respectively. The infection and disease burden are low and focal in 'Latin-America', 'Caribbean' and 'Middle Eastern crescent' countries. In respect of brugian infections, half of the global problem is contributed by China (32%) and India (20%) and the rest by other South-east Asian countries namely Indonesia, Thailand, Malaysia, Philippines, Vietnam.

The microfilaria and disease rates have been found increasing with age and the highest disease and microfilaria rates are encountered in 45-60 + age group. Males show 20% more cases in bancroftian filariasis and 25% more cases in brugian filariasis as compared to females. Though overall Chronic disease manifestations are more in males, lymphoedema cases are greater (about 18% more) among females. Similarly brugian filariasis cases are also higher amongst males as compared to the same in females (Mf: Males 6.52 million and females 3.84 million cases and Lymphoedema: Males 1.8 million and females 1 million cases).

The global burden of lymphatic filariasis was estimated to cause a loss of 8,50,000 Disability Adjusted Life Years (DALYs). Further data are required to arrive at reliable values of DALYs.

Ms. Shailaja Chandra, Chairperson, highlighted the proportion of cases contributed by India and advised that efforts should be made to reduce the disease burden in India.

RECENT ADVANCES IN FILARIASIS CONTROL

Dr. C.P. Ramachandran, WHO, Geneva

Dr. Ramachandran while mentioning that there was no single panacea available for the control of a disease like filariasis, proposed that multiple methods were to be incorporated in the long term control strategy. The success of a particular control strategy in one country may not be replicable in other countries. The strategy requires needful modifications suitable to the socio-cultural aspects of the community. Vector control is not to be used as a single option but as a potential adjunct to anti-parasitic measures.

Besides diethylcarbamazine (DEC), ivermectin has been evaluated to be another important tool for the control of bancroftian and brugian infections. Remarkable observations in the optimal use of DEC and ivermectin alone or in combination have been made in recent times. This has opened new vistas in launching the revised control strategies. The combination of two drugs i.e. DEC and ivermectin appears to be significantly more effective than either drug alone.

Various drug regimens used for filariasis control were reviewed by the speaker such as single dose DEC at weekly, monthly, six monthly and yearly intervals tried by many workers. Annual or six monthly single doses were found to be advantageous taking into consideration the expenses of drug delivery, drug compliance and efficacy in reducing microfilaria prevalence and density. Where the use of DEC is contraindicated in areas having coexistence with Onchocerciasis or Loiasis, ivermectin is the drug of choice. DEC fortified salt at concentrations ranging from 0.1% to 0.6% gave excellent results in reducing *W. bancrofti* and *B. malayi* microfilaraemia by 70% to 100% in 6-9 month studies. Adverse reactions caused by DEC and ivermectin were elaborately reviewed highlighting the advantage of DEC fortified regimen in preventing side effects of the drug.

There is increased understanding of pathogenesis of lymphoedema and acute adenolymphangitis (ADL) which has enabled undertaking of morbidity control measures. Simple measures like foot hygiene, foot care and the use of prophylactic use of antibiotics were found possessing profound effect in the prevention of damaging episodes of ADL. Recent studies revealed that many of the so-called 'asymptomatic' microfilaria carriers showed marked abnormal dilatation of lymphatics and abnormal lymph flow, low grade renal damage, which could be detected by lymphoscintigraphy technique. Vector control measures through the use of biocides, polystyrene beads, insecticide impregnated bed-nets, synthetic pyrethroids and integrated vector management serve as supplementary methods to chemo-therapeutic measures. New tools for diagnosis, epidemiological monitoring, assessment and evaluation were also reviewed. The recently available new diagnostic tools to detect circulating filarial antigen, DNA probes, rapid assessment techniques, predictive mathematical modelling, psycho-social and socio-economic issues related to control programmes were elaborately discussed by the speaker.

Operational Research in Filariasis

Dr. P.K. Das, Senior Deputy Director, Vector Control Research Centre, Pondicherry

In view of the limited financial resources made available to the National Filaria Control Programme, Dr. P.K. Das advocated the determination of the best course of control strategy that would yield optimum results in the containment of the problem. Accordingly intervention measures should be directed against the most vulnerable link in disease transmission chain. The best type of intervention measures should be selected to stop the spread of infection. He reviewed the vector control measures from 1981 to 1992. The relative advantage of the methods is dependent upon important variables. He highlighted the following four operational issues: (i) Mass DEC therapy with blood smear examination, (ii) Mass DEC therapy without blood smear examination, (iii) Selective treatment of microfilaria carriers after screening the population in the night blood survey and (iv) Survey of a section of population in the age group of 15 to 25 years and treatment of microfilaria carriers and immediate contacts.

Chemotherapy has two approaches: (a) Selective Chemotherapy and (b) Mass Chemotherapy. The latter approach (i.e. mass chemotherapy) can be implemented either by administration of tablets to the community as per the standard age-wise dosage schedules or through DEC medicated salt regimen. Among the two options of mass drug administration, DEC medicated salt is better because of least side effects of the drug and community compliance. Immunological responses in filariasis were elaborated by the speaker highlighting the role of immunological tolerance and concomitant immunity. Immuno-tolerance is maintained in the individual by continuous exposure to the infective larvae. He discussed in detail about the percentage reduction in the median microfilaria density, intermittent control methods, pulse treatment, critical house- hold levels, filariometric indices and the relative cost of different control strategies.

The optimisation of control measures should be adopted balancing the three important components of the control strategy which are: (a) transmission intervention measures to reduce man-mosquito contact, (b) chemo-therapeutic measures to reduce the reservoir of infection and (c)palliative measures to reduce morbidity caused by acute episodes and chronic manifestations. The speaker advocated that the treatment of 11 to 30 years age group would be very ideal. This age group is the most vulnerable group encompassing maximum number of microfilaria carriers in the community and as such the community will be very receptive to such an approach in the selective control strategy. The review of literature on operational research in India revealed that one single strategy was not sufficient to control the disease and a multi-pronged approach should be adopted to make an impact on the transmission of filariasis.

Dr. Orlov, Chairman of the session mentioned in his concluding remarks that the National Filaria Control Programme has lost its momentum and a big country like India should not depend upon one type of strategy for the entire country. The community response may vary in different geographical regions and motivation of community through IEC should be a prerequisite for successful implementation of the revised strategy. Periodic evaluation should be undertaken on inputs and outcomes. Stratified control strategy should be adopted suitable to coastal, southern and northern areas endemic for bancroftian and brugian infections. He thanked the speakers for their lucid presentations.

Filariasis Problem in India and the Current Control Strategy

Dr. R.S. Sharma, Director, NMEP, Delhi

As per the estimates made in 1994 about 412 million people (109 million in urban + 303 million in rural) are living in bancroftian endemic areas in 18 States and UTs transmitted by *Culex quinquefasciatus*. About 27 million persons are estimated harbouring microfilaria while about 21 million people have disease manifestations. Bancroftian filariasis contributes 99.4 per cent of filariasis problem in India. *Brugian Filariasis* transmitted by *Mansonia* mosquitoes is usually confined to rural areas mostly in the west coast of Kerala and a few pockets in six other States. About 2.5 million people are living in the endemic areas of *B. malayi*. Both the infections in the mainland India exhibit nocturnal periodicity. Diurnal sub-periodic form of *W. bancrofti* infection possibly transmitted by day biting *Aedes (Finlaya) niveus* group of mosquitoes is prevalent in Nicobar Group of Islands inhabited by about 10,000 population in four islands,. The first pilot project in the world for the control of bancroftian filariasis was taken up in Orissa from 1949 to 1954 using three control methods separately. These were: (i)five day mass DEC therapy (ii) indoor residual spray against adult vectors in rural and (iii) anti-larval measures in urban areas. The five year pilot study revealed a reduction of about 30% in the transmission by each method. The National Filaria Control Programme was launched in 1955 with the objectives: (i)to delimit the problem (ii) to undertake large scale control programme in endemic areas and (iii) to train the professional and ancillary personnel required for the programme.

The initial control strategies were mass DEC therapy at a dose of 4mg/kg body weight per day for five consecutive days, three rounds of indoor dieldrin spray in rural areas and weekly anti-larval measures in urban areas. The drawbacks of the control strategy surfaced in the initial years. The mass DEC therapy was withdrawn due to poor coverage on account of side effects of the drug and the indoor residual spray was withdrawn due to precipitation of resistance in bancroftian vector. On account of these problems, the programme was totally withdrawn from the rural areas hence only anti-larval measures continued at weekly interval in urban areas. Following the recommendations of Second ICMR Assessment Committee, selective DEC therapy to microfilaria carriers at dose of 6 mg per kg body weight per day for 12 days was introduced to supplement the anti-larval measures in NFCP towns.

At present there are 206 NFCP Control Units in urban areas with 198 Filaria Clinics and 27 Survey Units. The programme covers only 11% of the endemic population in the country. It was observed that 88% of the towns, where control measures had been in operation for more than five years, showed marked reduction in Mf rate and 69% of the towns showed reduction in disease rate. The programme was assessed periodically since its inception by independent experts under the aegis of Indian Council of Medical Research and the Assessment Teams made many recommendations for modification of the control strategy from time to time.

Review of ivermectin field trials in India and its prospects in the National Programme

Dr. Kumaraswami, Assistant Director, Tuberculosis Research Centre, Madras

Dr. Kumaraswami mentioned that the mode of action of anti-parasitic efficacy of ivermectin was possibly related to its ability to release the neurotransmitter substance gamma-amino butyric acid (GABA). Before undertaking human trials, the safety of the drug was widely studied in mice, rats, rabbits, swine, dogs, sheep and cattle for its general pharmacological, toxicological and teratogenic data and the information showed an acceptable degree of safety of ivermectin in mammals.

Ivermectin is the drug of choice against Onchocerciasis. It is a mixture of two microcyclic lactones derived from the fermentation of actinomycetes, *Streptomyces avermitilis*. The efficacy of the drug was discovered and developed in the laboratories of Merck Sharp and Dohm.

The hospital based clinical field trials were carried out in India initially in Madras and Bhubaneshwar against *W. bancrofti* infection and in Alleppey against *B. malayi* infection. The comparative efficacy and tolerability of single and split doses of ivermectin and DEC were studied. The microfilaria clearance and associated side effects were monitored in double blind studies.

In the first clinical trial in Madras 40 mf carriers with *W. bancrofti* infection divided into four equal groups were separately treated with ivermectin at doses of 25,50,100 and 200µg/kg body weight. The drug was found effective in all the four groups in clearing the circulating mf within 5 to 12 days. After three months the mf in most patients (89 to 92%) reappeared at 10 to 19% and after six months at 14 to 32% of the pre-treatment levels.

In the second trial in Madras ivermectin was given at a single oral dose of 20µg/kg body weight to the first group of 13 mf carriers and the second group of 13 mf carriers were given a single oral dose of 120µg/kg body weight, while a third group of 14 mf carriers were given DEC at a daily dose of 3 mg/kg body weight from day 2 to day 13. All the 26 patients in ivermectin groups were free from microfilaria, while 3 out of 14 in DEC group continued to show microfilaraemia.

The level of mf at two months and six months after treatment was 11.2% and 18.3% in the first group of ivermectin, 6.5% and 19.5% in the second group of ivermectin and 2.2% and 6.0% in DEC group respectively as compared to pre-treatment levels. The reappearance rate was found higher in ivermectin groups as compared to DEC group.

In Bhubaneshwar trial 60 mf carriers with *W. bancrofti* infection were divided into four equal groups and ivermectin was administered as a single oral dose at four dosage levels of 20µg, 50µg, 100µg and 200µg per kg body weight. Microfilaria from blood was cleared in all patients with all dosages within 1 to 14 days. In most patients the microfilaria reappeared by 3 months and 6 months and the levels averaged to 12.2% to 44% of the pre-treatment values in the four study groups.

In Alleppey trial 60 mf carriers with *B. malayi* infection divided into four equal groups were given single oral dose of ivermectin. The dosages were was 20µg, 50µg, 100µg and 200µg per kg body weight. After six months, 32 patients received repeat treatment with ivermectin at the same dose given initially. Reduction in circulating microfilaria was observed from 12 hours after initial dose up to 30 days and thereafter the mf started increasing. After 6 months the mf level reached 20 to 50 per cent of pre-treatment levels. The two higher dose groups showed faster and greater clearance as compared to the two lower dosage groups.

The side effects in all the treated patients generally consisted of fever, headache, cough, weakness, myalgia, lethargy, etc. The side effects were quantitatively and qualitatively similar in ivermectin and DEC groups. The side effects were more among patients with higher mf counts. The side effects subsided within 24 to 72 hours after simple medication.

The studies with ivermectin in other countries revealed that a single oral dose of 400µg/kg body weight yielded definitely superior microfilaricidal activity. The single yearly or even two yearly doses of ivermectin appear equally effective as similar dosing with DEC. Ivermectin field trials are in progress in Tamil Nadu under the aegis of CRME, Madurai and VCRC Pondicherry. When ivermectin is registered for large scale use in the control of lymphatic filariasis, it will serve as an additional tool in the mass treatment regimens in the national programmes of the endemic countries.

Dr. S. Pattanayak in his concluding remarks as chairperson of the technical session commended the interaction of the participants with the speakers and was very optimistic that the new control strategy would yield the desired results at a shorter interval with the dedicated team of workers in the country.

Proposed Strategy for the Control of Filariasis

Dr. R.S. Sharma, Director, NMEP, Delhi

Dr. R.S. Sharma outlined the following four components of revised control strategy: (i) Single dose mass DEC therapy at a dose of 6 mg/kg body weight once a year (ii) Management of acute and chronic filariasis through referral services at selective centres (iii) IEC for inculcating individual/ community based protective and preventive measures for filaria control and (iv) continuation of anti-vector measures in all the NFCP towns as a complimentary to anti-parasitic measures and the mf carriers detected in filaria clinics and elsewhere will receive standard dose of 6 mg/kg body weight per day for 12 days. He enumerated the advantages of single dose DEC mass therapy as follows:(i) It appears to be as effective as the 12 day therapy as a public health measure (ii) It has lower side effects thereby facilitating better public compliance, (iii) It involves decreased delivery costs (iv) It does not require complex management infrastructure (v) It can be integrated into the existing primary health care system for delivery compliance, (vi) Single dose mass therapy in combination with other techniques has already eliminated lymphatic filariasis from Japan, Taiwan, South Korea and Solomon Islands and markedly reduced the transmission in China and (vii) DEC mass therapy is much safer in India in the absence of onchocerciasis and Loiasis infections.

He listed the following points for management of acute and chronic manifestations in the revised strategy: (i) Adequate referral centres for filaria case management to be developed in the selected centres initially which will have to be extended to other areas, (ii) Treatment of adenolymphangitis (ADL) with the antibiotics to be augmented since majority of acute episodes appear to be of bacterial aetiology, (iii) Rigorous local hygiene with or without local antibiotic and anti-fungal agents to be promoted to prevent ADL so as to permit the reversal of lymphoedema. (iv) Early treatment with standard 12 day DEC therapy of mf carriers to be adopted to prevent further lymphatic damage and renal failure, (v) Community health education to be intensified emphasising the importance of local hygiene to the affected limbs and to organise self-help support groups through NGOs and (vi) Project proposals to be taken up for imparting training to medical profession on the latest surgical techniques in filariasis in selected medical institutions through the Indian Council of Medical Research in collaboration with the World Health Organisation and other bilateral agencies.

He reiterated the proposal of observing the National Filaria Day (NFD) on 5th August every year for five years from 1966 to 2000 AD since 5th August falls on school working days during the five consecutive years thereby enabling to integrate the single day mass therapy with midday meal programme of school going children. NFD could be taken up in selected districts in the endemic belts in 1996 which could be extended to the entire endemic districts in the subsequent two years. The average per capita expenditure of single dose DEC comes to 28 paise which will prove to be cost-effective in achieving the goal of the revised strategy.

COMMUNICATION STRATEGY FOR REVISED FILARIASIS CONTROL

Dr. S.V. Dharan, Director, Central Health Education Bureau, New Delhi

Dr. Dharan emphasised the importance of communication development for successful implementation of revised strategy for the control of filariasis. She said that community education was an integral part for the success of any mass based health programme. She asserted that individual and community protective and preventive measures need to be propagated within the socio-economic environment to generate a demand for the envisaged services from the revised strategy for the control of filariasis. The communication methodology shall be oriented in convincing the community that the revised strategy will be highly beneficial to the community and the new generation will be totally freed from the ugly manifestations of filariasis. The communication modules shall be simple and effective in conveying the message. Preferably the message shall be pictorially depicted which could be easily understood by semiliterate also and the written script shall be in local language so as to reach the maximum persons of target group. The involvement of opinion leaders as well as non-formal leaders will serve the objective in disseminating the message to the community for seeking their full co-operation and active participation in the revised strategy. The mass media methods like TV, Radio, Video Quickies, Video on Wheels, Cable TV, and the print media like posters, folders, hand bills, etc. shall be judiciously utilised through the help of mass media experts to relay the message to every nook and corner of the vast endemic belts. The preparation for the National Filaria Day shall be planned in advance taking advantage of the experience gained in the observation of national days for other health programmes like National Immunisation Day. She assured that the Central Health Education Bureau would extend all the needful help in developing the mass communication material for successful implementation of the National Filaria Day.

STATE'S PROPOSED PLAN FOR THE REVISED STRATEGY

ANDHRA PRADESH

East Godavari and Srikakulam districts are proposed to be taken up in the first year of the revised strategy for control of filariasis. The population as per 1995 estimate is 4.91 million in East Godavari District and 2.49 million in Srikakulam district. There are 60 PHCs, 553 Sub-centres and 1411 villages in East Godavari district and 54 PHCs, 291 Sub-centres and 3813 villages in Srikakulam district respectively. The endemicity rate during 1995 was 2.9% and 5.0% in East Godavari and Srikakulam districts respectively.

Health Infrastructure: The total sanctioned strength of health personnel in East Godavari and Srikakulam districts is 2729 and 773, while the vacant posts are 321 and 197 respectively. Efforts are being made to fill the vacant posts on priority in view of the Revised Strategy.

In East Godavari district 42 vehicles are road-worthy while 27 vehicles are in working condition in Srikakulam district. The list of organisations for intra and inter-sectoral co-ordination is given in the report of the State.

The requirement of funds for NFD is given below:

Item of Expenditure	Cost
1. Cost of 44.4 million tablets	Rs. 20.72 lakhs
2. POL	Rs. 19.84 lakhs
3. Biscuits	Rs. 37.00 lakhs
4. IEC material	Rs. 5.00 lakhs
Total	**Rs. 82.56 lakhs**

The calendar of activities, Reporting System, Nodal Officers at different levels and PHC-wise population are furnished in the detailed report prepared by the State.

BIHAR

Two Districts namely Darbhanga and Siwan are proposed by the State for revised control strategy and the population of the two districts is 2.51 million and 2.17 million respectively. There are 13 blocks in Darbhanga, 15 blocks in Siwan and the filaria vector density was 109 and 132 per 10 man hours respectively. The infection rate was 9.5 % in Siwan and 0.9% in Darbhanga. The State representative identified the shortage of staff due to vacancy and the acute shortage of vehicles as major problems. Only three vehicles are in working condition out of 34 vehicles. At present there are no NGOs to co-ordinate NFD in the two districts.

KERALA

Two districts namely Alappuzha (Alleppey) and Kozhikode (Calicut) with a population of 2.76 million and 2.11 million respectively are proposed for the revised strategy. The endemicity rate during 1994 was 2.1% in the former district while the same in the latter district was 0.21%. However, the endemicity rate in Kozhikode during 1995 (up to October) was 1.66%. There are 87 medical institutions, 69 villages and 356 sub-centres in Alappuzha district while in Kozhikode 129 Medical Institutions, 87 villages and 369 Sub-centres are present. The requirement of IEC material and names of nodal officers are given in the report of the State.

The states requirement of funds for POL is Rs. 2.0 lakhs and for IEC for NFD is Rs. 12.0 lakhs apart from the requirement of DEC tablets.

ORISSA

Two districts namely Khurda and Puri are selected for the revised strategy. The population in Khurda District is 1.63 million while the same is 1.41 million in Puri District. The mf and disease rates in Khurda district during 1995 were 7.67% and 15.3% while the same in Puri district were 9.8% and 1.8% respectively. The number of important NGOs working in Puri and Khurda districts are 8 and 12 respectively. The names of NGOs are furnished in the state report.

The requirement of material and funds for observing NFD is as follows:

Items of expenditure	Requirement
1. DEC tablets	11 million tablets
2. POL funds	Rs. 1.25 lakhs
3. IEC material	Rs. 1.05 lakhs

Health Infrastructure: In Khurda district, there are 7 Govt. Hospitals, 17 Govt. dispensaries, 2 CHCs, 2 UGPHCs, 7PHCs, 21 new & additional PHCs and 186 Sub-centres. There are 11 BEEs, 34 LHVs, 186 HW (F), 192 HW(M), 1091 VHGs, 799 TBAs, 283 Anganwadi Workers and 13 Anganwadi Supervisors.

In Puri District, there are 11 Govt. hospitals, 4 Govt. dispensaries, 4 CHCs. 2 UGPHCs, 6 PHCs, 21 new & additional PHCs, and 262 Sub-centres. There are 12 BEEs, 45 LHVs, 58 MPHs, 179 HW (M), 261 HW (F), 984 VHGs, 1003 TBAs, 84 Anganwadi Workers and 3 Anganwadi Supervisors. Block-wise distribution of medical institutions is furnished in the report.

TAMIL NADU

Two districts namely North Arcot and South Arcot with a population of 5.23 million and 4.83 million respectively are proposed for the revised strategy. In North Arcot district there are 2021 villages, 9 Municipalities, 38 Hospitals, 141 Primary Health Centres, 872 Health Sub-centres, 1751 field public health functionaries and 6 voluntary agencies. In South Arcot district there are 2389

villages, 7 Municipalities, 12 hospitals, 133 Primary Health Centres, 876 Health Sub-centres, 1708 field public health functionaries and 74 voluntary agencies. The endemicity rate in 1995 was 0.42% in urban areas, 2.3% in rural areas of North Arcot district and 0.66% in urban areas and 0.58% in rural areas of South Arcot District. The district-wise health manpower, list of NGOs, requirement of IEC, details of Nodal Officers and proformae for monitoring of NFD and the details of expenditure are given in detail in the state report. The budget requirement of Rs. 32.68 lakhs for IEC is projected for the revised strategy.

UTTAR PRADESH

Two districts namely Varanasi with a population of 5.3 million and Gorakhpur with a population of 3.3. million are proposed for the revised strategy. The endemicity rate as per survey team reports was 9.0% in Varanasi District and 16.12% in Gorakhpur District. The State representative furnished full details of the existing NFCP.

WEST BENGAL

Purulia district with a population of 2.22 million spread in 20 developmental blocks, 2456 villages and 3.8 lakhs households is proposed for the revised strategy. The district has 2.01 million rural population and 0.21 million urban population. There are 72 PHCs and 385 Sub-centres. The State representative projected the total cost of revised strategy in 9 districts in West Bengal. Strengthening of referral centres for filaria case management will be augmented through World Bank assistance soon. This project has strong training and Health Management Information System (HMIS) components which will be utilised to train doctors in diagnosis and treatment of filaria patients appropriately at the local level and surgical treatment will be provided at district level. The revised strategy could therefore complement and consolidate investments made in the World Bank aided Project by providing basic infrastructure.

Before formation of the groups, Dr. Jaishri Jethwaney, Professor of Indian Institute of Mass Communication, was invited to apprise the participants on IEC. She gave the relevant methods to be observed for the successful implementation of the revised strategy for the control of filariasis.

Dr. Paul Kandaswamy, Joint Director, Directorate of Public Health and Preventive Medicine, Tamil Nadu apprised the participants about the successful implementation of DEC medicated salt trial in Tamil Nadu.

GROUP DISCUSSIONS AND RECOMMENDATIONS

GROUP 1

SINGLE DAY DEC MASS THERAPY AND CASE MANAGEMENT: STRENGTHENING OF REFERRAL SYSTEM.

1. **Target population and area to be covered**

The revised strategy will be implemented in the identified 13 districts of seven States. The approximate population to be covered will be 4.1 crores (41 million) in the first year and by 1998 the entire 412 million endemic population will be brought under the revised strategy.

2. **Phasing of the Strategy**

i) **Planning Phase**

a) Training of personnel involved in the revised strategy

b) Arrangements of funds for the DEC, POL and IEC material

c) Arrangements of logistics

ii) **Preparatory Phase**

Broad calendar of activities as given in the draft document is agreed.

iii) **Implementation Phase**

a) Broad strategy defined in the document is agreed upon. (The representatives of Andhra Pradesh feel that in their districts on account of heavy rains during the month of August, NFD should be observed in the month of October/November. (However, the change of months for NFD is not recommended by the group)

b) Single day drug therapy will be for first two years followed by a medicated salt for another three years. Thus the programme will go on for a total period of five years. Where medicated salt is not available, the annual single day therapy will continue. The community should be educated to get the drug after meals. The cases will be treated with the standard recommended regimen for foot hygiene & antibiotics for which the field personnel will be given adequate training.

3. **Infrastructure through which it is to be implemented**

At the Central level Directorates of NICD and NMEP will be the nodal agencies. They will be responsible for procurement of drug and developing strategy for IEC. They will arrange necessary funds for the same. At the State level State Programme Officer (Filaria) will act as nodal agency.

Chief Medical Officer in the identified district will look after the programme for the district. MO, in-charge of the PHCs through its staff will take part in actual implementation of NFD. In urban areas, Corporation/Local Bodies and FW Centres will look after the programme. Maximum participation of NGOs will be ensured.

4. **Procurement, Distribution and Delivery System of DEC**

As envisaged in the revised strategy, Director NMEP will procure the DEC tablets, which will be directly supplied to CMOs who will distribute them to Primary Health Centres. The drugs will be stored at Sub-centres for NFD.

For supply of DEC medicated salt it is proposed that the major supply of DEC medicated salt shall be procured from the manufacturing agencies.

5. **Requirement of Resources in Terms of Finances, Trained manpower, drugs and material**

It should be worked out by the Directorates NICD & NMEP.

6. **Mobilisation of Resources through Restructuring of Already Available Resources and through Additional Resources**

It is proposed that DEC tablets powder and POL will be funded totally by the Centre and expenditure for IEC activities will be carried out by the individual States on the sharing basis in the ratio of 85:15 between Centre and States respectively.

7. **Operational Guidelines**

As laid down under item Nos., 6.1, 6.1.5, 6.1.6, 6.1.7, 6.1.8, 6.1.9, 6.2 and 6.3 of document of the revised strategy for control of filariasis, is broadly agreed to (vide Appendix - 3).

8. **Monitoring and Evaluation System**

Concurrent and terminal evaluations will be done by a committee of independent experts. Broad outlines of the evaluation as specified under items 7.1, 7.2 and 7.3 of the document of revised strategy will be followed (vide Appendix-3).

GROUP 2

IEC AND DEVELOPMENT OF PROFORMAE FOR MONITORING AND ASSESSMENT OF REVISED STRATEGY FOR CONTROL OF FILARIASIS IN INDIA

The group deliberated and eventually reached a consensus that instead of naming it 'National Filaria Day', we should change the nomenclature to 'Filaria Day' as during the current year the programme of mass chemotherapy on August 5, 1996, is restricted only to 13 districts in the country. (However, after deliberations the Group agreed to retain 'National Filaria Day' in view of extension of the revised strategy to all endemic districts by 1998)

Objectives of the IEC Programme:

To create awareness among the target segments (40.91 million people) about the Filaria Day and inducing them to take the DEC tablets.

Target population to be reached:

Among the 40.91 million population in 13 districts, everyone is to be reached. But in order to reach out to different segments through appropriate media, the target population is divided into three major segments:

1. School/College students and drop-outs. (Age: 5 years - 20 years)
2. Industrial workers/Agriculture workers (20 years +)
3. Women (20 years +).

In order to know the demographics and psychographics of the target public, secondary data analysis will be necessary for choosing the appropriate media and knowing their communication habits.

Other targeted segments to receive this message are:

1. Medical Community (Doctors, Paramedical staff, Health workers, Anganwadi workers, etc.)
2. Opinion makers (Local MPs/MLAs, bureaucrats, school teachers, panchayat members, industrial sector officers, Mahila Mandal Chiefs, etc.)
3. General population (Youth, School/College going/school drop-outs, Industrial workers and women).

While it is a matter of detail to workout the specific communication messages to suit the level of comprehension of the above mentioned target audience, an attempt has been made to give below the information required to be included for two target segments viz. the general public and the medical fraternity.

Message treatment for general public

Message input:

- In order to prevent filaria, do not forget to take the DEC tablets.
- Remember August 5 is the Filaria Day.
- Take your free-dose of medicine from health worker, Primary Health Centre, Filaria Clinic or Filaria Control Unit or other designated outlets.

Additional Input:

A few may get fever, headache, nausea or feel uneasiness; it is possible you are carrying the filaria parasite. Do not panic. It is an indication that the medicine is having its impact. If the symptoms persist for more than three days, consult the doctor.

The above mentioned message would be suitably adapted to suit the required media in which it is intended and the target segments for which it is used. It is recommended to have these messages in the local language of the district.

Message Statement for the Medical Fraternity:

Remember August 5. is the Filaria Day. The following schedule is recommended.

Age group		Dose of DEC
18 years and above	300mg	(three tablets of 100 mg each or six tablets of 50 mg each).
12 to 17 years	225 mg	($2^{1/4}$ tablets of 100 mg each or $4^{1/2}$ tablets of 50 mg each).
6 to 11 years	150 mg	($1^{1/2}$ tablets of 100 mg each or 3 tablets of 50 mg each).
2 to 5 years	75 mg	(3/4 tablet of 100mg or $1^{1/2}$ tablets of 50 mg each).
1 year	30mg	(1/3 tablet of 100 mg or 2/3 tablets of 50 mg).

Note: Infants need not be given DEC in view of long pre-patent period of filaria infection.

Where to say? (Use of media vehicles):

As the message dissemination is restricted only to 13 districts of the country covering a population segment of 40.91 million, use of mass media at national level is ruled out. While it is a matter of detail to work out the appropriate media to suit its reach and accessibility to the target audience, following means of media are recommended:

1. Local News Papers
2. Programmes in Local Radio Stations/Regional TV Programmes
3. Posters/Pamphlets/Direct-mailers/Cable Network
4. Inter-personal communication including folk media, local hats, melas, etc.
5. Video-vans and Outdoor publicity (wall slogans, etc.)

The Ministry of Information and Broadcasting has a wide network throughout the length and breadth of the country with their mass media officers posted at district level and their services can be utilised for sensitising the media. The message can be made to reach every nook and corner through their field publicity units. Every district also has State District Information Officer who is trained in mass-media handling. His services can also be fruitfully utilised in dissemination of information about the Filaria Day.

Phasing of the Strategy/Time-table:

a. Planning Phase: January-March, 1996

b. Preparatory Phase: April-July, 1996

c. Implementation Phase
(Launching of awareness campaign): July 5 to August 5,1996.

Infrastructure through which to be implemented:

Existing and as indicated above.

Problem for procurement and distribution of delivery system:

NICD and NMEP: This will flow from the Centre to the State Programme Officers. It will further trickle down to district administration and Sub-centres through existing channels.

Requirement of resources:

1. **Finance:** Finances would be required for training the existing man-power and producing the information material. (Rs. 4 Lakhs per million population is worked out, based on past experience of the Tamil Nadu in the Pulse Polio Immunisation Programme - 1995). Hence the total expenditure would workout to 40.91 x 4 = Rs. 1,63,64,000/- (Rupees One Crore sixty three lakhs and sixty four thousand only). The expenditure is worked out for a period of five years. An escalation of 5 per cent may be added keeping in view the inflation rate, etc.

2. **Manpower:** For taking the responsibility of the IEC work, the man-power required would include existing medical officers and other health personnel, voluntary workers, teachers, local leaders, private practitioners, panchayat members, social workers, etc.

3. The existing available resources may be augmented by mobilising extra resources from Pharmaceuticals, NGOs, Rotary Club and Lions Clubs, Corporate Bodies, (The Government can offer financial concessions like tax relief) and also from International agencies.

Operational Guidelines:

During the preparatory phase of April-July, 1996 the following activities need to be taken up:

1. The District Health Officer need to draw a list of the Centres, the personnel and the quantum of drug required.
2. Meetings/Training of Medical Officers, Hospitals, Primary Health Centres, NGOs, Private Practitioners, State Government Officers, Panchayats, School Principals, Corporate Bodies and other Institutional Bodies need to be taken up.
3. Convening of Inter-departmental meetings for support and networking.
4. Arrangement of Administrative support (Pooling of vehicles, manpower, fixing of responsibilities, etc.).

Monitoring and Evaluation System:

It should be three pronged viz.

a. A KAP study to know the knowledge, attitude and practices of a random sample of target population of 13 districts. This will be followed by a pre-test of media material.

b. A mid-term appraisal of the IEC Programme.

c. A media impact study at the end of the programme.

After presentation of group recommendations, the entire house made the salient recommendations for the revised strategy for control of filariasis.

RECOMMENDATIONS OF THE NATIONAL WORKSHOP ON REVISED STRATEGY FOR THE CONTROL OF LYMPHATIC FILARIASIS IN INDIA

Deeply concerned with the widespread and increased distribution of lymphatic filariasis in various parts of India [412 million (rural 303 million and urban 109 million) exposed to the risk of infection with 27 million microfilaria carriers and 21 million filaria disease cases] covering both urban and rural areas affecting all age and gender groups in 18 States and Union Territories;

Recognising that lymphatic filariasis is caused by the filarial parasites, *W. bancrofti* and *B. malayi*, which can be transmitted by two mosquito genera viz. *Culex* and *Mansonia* in a wide diversity of habitats;

Being aware that the disease transmission and vector breeding are mainly caused in dense aggregates of human populations living in inadequate environmental conditions as seen by insufficient water supplies, sewage disposals, solid waste management and poor waste water drainage and accepting the vital role which can be played by non-health sector to improve urban environments in filariasis endemic countries;

Recognising that there is a lack of awareness concerning the global burden of disease and its impact upon health status, and insufficient data on patterns of infection along with inadequate personnel and the necessary resources for rapid disease assessment and control;

Appreciating the grave concern for the gross morbidity, social stigma, psycho-social problems, chronic and debilitating aspects of the disease affecting the most economically productive age groups due to episodic filarial fever attacks;

Recognising especially that recent studies have defined new methods for detecting and managing early lymphatic pathology, have developed new methods for disease management using once-yearly DEC or a single dose combination of ivermectin or routine use of salt fortified with DEC, and have identified improved methods for vector control and surveillance;

Acknowledging that an international task force for disease eradication identifies this grossly neglected disease as potentially eradicable;

Being aware that there are many difficulties faced by governments in endemic countries in organising, financing and staffing national filariasis control activities; requiring the joint efforts of high level policy and decision makers with health authorities and municipal planners for surveillance, operational research, disease management and vector control.

The Workshop:

1. **CONFIRMS** that the prevention and control of lymphatic filariasis should be among the national priorities of India.

2. **URGES** the State health authorities:

(i) to take advantage of recent advances in the understanding of lymphatic filariasis and the new opportunities for its control;

(ii) to strengthen national prevention and control of lymphatic filariasis mechanisms ensuring inter-sectoral collaboration regarding the monitoring and evaluation of all control measures;

(iii) to strengthen local programmes, in particular at the urban level, to implement simple, affordable, acceptable and sustainable control technologies including urban planning, environmental sanitation and vector control;

(iv) to strengthen training, research, diagnostic, laboratory and disease management capabilities in order to improve clinical, epidemiological and control activities directed at lymphatic filariasis;

(v) to involve all relevant sectors and mobilise affected communities, enlisting their active participation and those of non-governmental agencies (NGOs) for the control of the disease;

(vii) to link wherever possible and desirable the control of lymphatic filariasis with the control of other vector-borne diseases to environmental management.

Observing that the current National Filaria Control Programme (NFCP) in operation for the last four decades could not achieve the desired results due to a variety of reasons both operational and financial;

3. **RECOMMENDS**

1. The initiation of a revised NFCP strategy on a pilot scale covering highly endemic states and districts from 1996 and the revised strategy be extended to all the endemic areas in the country in phases by 1998.

2. The revised strategy will be an additional input on the existing NFCP strategy to make it technically more precise, and cost-effective so as to achieve the desired results.

3. And endorses, in principle, the revised strategy for control of filariasis in India circulated by the Directorate of National Malaria Eradication Programme (NMEP) and National Institute of Communicable Diseases (NICD).

4. The revised strategy covers the entire population, both in rural and urban areas as the problem of filariasis is equally high in rural areas and the current programme does not have any component to cover rural areas. The present available technology is equally effective both in the rural and urban areas and is affordable, feasible, sustainable and cost-effective.

5. The revised strategy be primarily focused around observing one day as National Filaria Day on which entire target population to be covered will be provided with single dose of Diethylcarbamazine citrate 6 mg/kg body weight. This will be observed once a year for a period of 2-3 years to bring down infection rate to an appreciably low level so that transmission will be reduced and lymphatic filariasis ceases to be a major public health problem.

6. That this effort be continued through coupling with DEC medicated salt for another 3-5 years based on the opinion of International Experts that the disease is amenable to elimination.

7. After detailed deliberations on the endemicity, the current status of the programme and the available infrastructure, that the following highly endemic states/districts could be taken up with the revised NFCP on a pilot basis from 1996.

	States	Districts	Population (in million)
1.	Andhra Pradesh	1. East Godavari	4.91
		2. Srikakulam	2.49
2.	Bihar	3. Darbhanga	2.51
		4. Siwan	2.17
3.	Kerala	5. Alappuzha(Alleppey)	2.11
		6. Kozhikode(Calicut)	2.76
4.	Orissa	7. Khurda	1.63
		8. Puri	1.41
5.	Tamil Nadu	9. North Arcot	5.23
		10. South Arcot	4.87
6.	Uttar Pradesh	11. Gorakhpur	3.30
		12. Varanasi	5.30
7.	West Bengal	13. Purulia	2.22
	Total		**40.91**

8. To make the National Filaria Day successful, people's co-operation and participation is highly essential. To achieve the same, high profile IEC programme tailor made for the target population involving mass media, print media, inter-personal communication, health education, community participation, etc. needs to be implemented. The expenditure on IEC may be shared between the Centre and States in the ratio of 85:15.

9. For the successful implementation of the National Filaria Day the anti-parasitic drugs need to be procured and distributed through all the health care delivery points through appropriate logistic support and the Group recommends that the drugs are to be procured by Government of India and given to the States. The expenditure on POL is also to be met by Govt. of India. Distribution of drugs through the entire health care delivery network and administration of drugs should be the responsibility of the State governments.

10. The revised strategy be periodically monitored and reviewed through the network of institutions of NICD and its branches, Regional Offices of Health & F.W., ICMR institutions like RMRC, Bhubaneshwar, VCRC, Pondicherry and the concerned State Health authorities.

11. The revised strategy include a component for management of acute and chronic filariasis involving the existing filaria clinics, the existing medical college hospitals, district hospitals, training of physicians, paramedical staff, etc. in proper case management. For proper management of morbidity the drugs will be provided by the states and the training for morbidity control will be provided by the national programme management. The management of acute filariasis including *microfilaria carriers* will be given the prescribed full standard treatment as per the guidelines including antibiotics.

12. The existing NFCP units will continue to function as it is today for vector control activities. These vector control activities are also supplemented with malaria control activities under the urban malaria scheme. In the rural, areas no new filaria vector control measures are recommended.

13. Personal prophylactic measures through use of impregnated bed-nets being considered under NMEP to strengthen the filaria vector control.

14. The Group also recommends establishment of an inter-sectoral co-operation mechanism particularly in the urban areas and project areas which create mosquitogenic situations and, therefore, the Municipal Bye-laws should be appropriately implemented. Project authorities and all the related ministries should contribute in generating resources in anti-vector measures.

15. In the light of the fact that the first ever pilot project in the world for the control of filariasis was undertaken by the erstwhile Malaria Institute of India (presently the National Institute of Communicable Diseases) and the launching and subsequent monitoring of NFCP by NICD for 23 years (1955-1978), the participants strongly recommend that the programme management need to be entrusted to NICD for successful implementation of the revised strategy. The Directorate of NMEP, which is fully preoccupied with the implementation of accelerated malaria action programme to contain the fulminating malaria epidemics which claimed many lives recently, may be freed from the burden of management of filaria control. The main reason for transfer of NFCP in 1978 from NICD to NMEP was the principal control methodology (anti-larval measures) being similar in towns covered under Urban Malaria Scheme and NFCP. Now the main thrust in the revised strategy being the single dose mass therapy rather than vector control, NICD which is already bestowed with expertise in achieving successful eradication of smallpox, bringing guinea worm disease on the verge of eradication and containing quickly the spread of plague epidemic, it would be appropriate to entrust the national task of filaria control to NICD for achieving the time-bound goal of the new strategy.

16. There should be provision for independent appraisal of the progress of the revised filaria control programme.

The draft document on revised strategy circulated to all the participants ten days prior to the workshop was approved in principle by the participants unanimously. The final document on the Revised Strategy after incorporating various suggestions made by the participants is given in Appendix-3.

APPENDICES

APPENDIX 1

LIST OF PARTICIPANTS

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4. Dr. P.R. Arbani
   Regional Adviser (Malaria)
   SEARO, New Delhi

5. Dr. A.K.M. Kafiluddin
   Consultant

APPENDIX 2

PROGRAMME

4th January, 1996

Time	*Activity*	
09.00-10.00	Registration of participants	
10.00-10.45	Inauguration	Lecture Hall
	Welcome and opening remarks	Dr. K. K. Datta, Director, NICD
	Objectives	Dr. Gautam Biswas, Deputy Director, NICD
	Addresses by	Dr. R. S. Sharma, Director, NMEP
		Dr. Prema Ramachandran, Adviser (Health), Planning Commission
		Dr. V.S. Orlov Sr., Regional Adviser (MAL& VBC),WHO, SEARO
		Ms. Shailaja Chandra, Additional Secretary to the Govt. of India, MOH&FW
	Inaugural Address	Dr. N. K. Shah, WHO Representative to India
	Vote of Thanks	Dr. B. P. Patnaik, Jt. Director, NMEP
10.45 -11.00	Tea	
	TECHNICAL SESSION - I	
	Chairperson: Ms. Shailaja Chandra	
	Rapporteurs: Dr. Gautam Biswas Mr. V.K. Raina	
11.00-11.30	Filariasis Problem : Global scenario	Dr. C.P. Ramachandran, WHO, Geneva
11.30-12.00	Regional scenario of filariasis	Dr. V.S. Orlov, SEARO WHO, New Delhi
	TECHNICAL SESSION - II	
	Chairperson: Dr. V.S. Orlov	
	Rapporteurs: Mr. C. Krishna Rao Dr. H. Biswas	
12.00-12.30	Recent advances in filariasis control	Dr. C. P. Ramachandran, WHO, Geneva
12.30-13.00	Operational Research in Filariasis	Dr. P.K. Das, Senior, Dy. Director, V.C.R.C
13.00-14.00	Lunch	
	TECHNICAL SESSION - III	
	Chairperson: Dr. S. Pattanayak	
	Rapporteur: Dr. S.S. Saha	
14.00-14.30	Filariasis problem in India and current control strategy	Dr. R.S. Sharma, Director, NMEP
14.30-15.00	Review of ivermectin field trials in India and its prospects in the national programme	Dr. V. Kumaraswami, Dy. Director TB Research Centre, Madras

TECHNICAL SESSION - IV

Chairperson: Dr. K. K. Datta

Rapporteurs: Dr. C.N.S. Md. Koya
Dr. R. N. Rai

15.00-15.30	Proposed strategy for control of filariasis	Dr. R.S. Sharma, Director NMEP
15.30-16.00	Communication strategy for revised filariasis control	Dr. S.V. Dharan, Director, CHEB

TECHNICAL SESSION - V

Chairperson: Dr. S.P. Mukhopadhyay

Rapporteurs: Dr. S.K. Patnaik
Mr. C. Krishna Rao

16.00-16.40 Proposed state plan of activities for revised strategy -

- Andhra Pradesh
- Bihar
- West Bengal
- Orissa

TECHNICAL SESSION - VI

Chairperson: Dr. M.C. Tripathi

Rapporteurs: Dr. D.C. Jain
Dr. V.K. Saxena

16.40-17.20 Proposed state plan of activities for revised strategy -

- Maharashtra
- Uttar Pradesh
- Kerala
- Tamil Nadu

5th January, 1996

10.00-10.30	**TECHNICAL SESSION -VII** Formation of groups for workshop and discussion of their terms of reference	
10.30-13.00	**GROUP DISCUSSIONS**	
	Group - I: Single day DEC mass therapy and case management: and strengthening of referral system	Biochemistry Seminar room
	Group - II: IEC and Development of proformae for Monitoring and Assessment of Revised Strategy	Seminar room 1
13.00-14.00	Lunch	
14.00-15.30	**Group Discussions continued**	
15.30-16.30	**Presentation of group recommendations** (30 minutes for each group) **Chairperson**: Mr. Gopala Krishna Pillai **Rapporteur**: Dr. G. Biswas	
16.30-17.00	**Workshop Recommendations**	

REVISED STRATEGY FOR CONTROL OF FILARIASIS IN INDIA

1. Historical Background

Filariasis has been the major vector-borne public health problem in India next only to malaria. The disease was recorded in India as early as sixth century B.C. by the famous Hindu physician Susruta. In Seventh Century AD, Madhavakara described the signs & symptoms of the disease which hold good even today. In 1709 Clarke called elephantiasis of legs in Cochin as 'Malabar legs'.

2. Species of Infection

In mainland India, *Wuchereria bancrofti* transmitted by the ubiquitous vector, *Culex quinquefasciatus*, has been the most predominant infection contributing 99.4% of the problem in the country. The infection is prevalent both in urban and rural areas. *B. malayi* infection is mainly restricted to rural areas due to peculiar breeding habits of the vector associated with floating vegetation. *Mansonia (Mansonioides) annulifera* is the principal vector while *M.(M). uniformis* is the secondary vector. The role of *M.(M) indiana* in transmission is very limited due to its prevalence in small numbers.

Both *W. bancrofti* and *B. malayi* infections in mainland India exhibit nocturnal periodicity of microfilaraemia.

In 1974-75 diurnal sub-periodic *W. bancrofti* infection was discovered among aborigines inhabiting the Nicobar Group of Andaman & Nicobar Islands. *Aedes (Finlaya) niveus* group of mosquitoes are suspected to be the vectors for this infection.

3. Trend and present endemicity of the problem

3.1. The problem of nocturnally periodic bancroftian filariasis from 1953 onwards is given in Table 1.

Table-1 Problem of *W. bancrofti* Infection at Different Points of Time (in million)

Year	Population exposed to the risk of infection			Microfilaria carriers	Filaria disease cases
	Rural	Urban	Total		
1953			25.00		
1962	40.16	34.08	64.24	5.30	4.40
1970	84.91	51.39	136.30	11.30	8.00
1977	174.08	62.05	236.13	18.31	14.44
1981	221.92	82.18	304.00	21.74	15.84
1985	251.80	90.56	342.36	23.70	17.56
1989	275.36	98.94	374.30	25.00	19.00
1994	302.87	108.78	411.65	26.92	20.40

Though the disease has been prevalent since antiquity, no organised survey or estimate had been made to delimit the problem in the country. Megaw and Gupta (1927) were the first to publish filaria map of India based on night blood surveys conducted in different parts of the country. Jaswant Singh and Raghavan highlighted the problem in 1953 and prepared an endemicity map based on replies received to a questionnaire circulated to different States. The estimates made in 1962, 70 and 76 revealed the problem to be much higher than what had been estimated earlier. In 1981 the delimitation surveys throughout the country showed about 304 million people living in endemic areas. The latest surveys in 1994 indicate that 411.7 million people are exposed to the risk of bancroftian infection and of them 108.8 million live in urban and 302.9 million in rural areas. About 26.9 million people are estimated to be harbouring microfilaria (mf) and about 20.4 million suffer from chronic filaria disease manifestations.

Thus it is discernible from Table-I that the problem increased manifold during the last three decades. The increase is mainly due to i). extension of delimitation surveys in hitherto un-surveyed districts. ii). natural growth of population in the endemic areas and iii). spread of infection to new areas previously known to be non-endemic.

State-wise distribution of population at risk, no. of mf. carriers and no. of persons with chronic disease manifestations during 1994 is given in Table-2.

Table-2: State-wise estimated population exposed to the risk of filariasis and estimated number of mf carriers and filaria cases as on 31.12.1994

(figures in millions)

Sl. No	Name of the State/ Union Territory	Population at Risk			No. of Mf. Carriers	No. of Disease Cases
		Total	Rural	Urban		
1.	Andhra Pradesh	52.42	39.68	12.74	3.90	1.45
2.	Assam	10.18	9.14	1.04	0.38	0.09
3.	Bihar	62.70	54.68	8.02	4.25	5.83
4.	Goa	1.21	0.71	0.50	0.01	0
5.	Gujarat	17.93	10.80	7.13	1.08	0.14
6.	Karnataka	11.56	8.83	2.73	0.74	0.08
7.	Kerala	30.76	22.99	7.77	2.44	2.40
8.	Madhya Pradesh	23.39	18.98	4.41	0.55	0.08
9.	Maharashtra	18.19	3.26	14.93	0.93	0.17
10.	Orissa	26.52	23.51	3.01	2.34	1.48
11.	Tamil Nadu	38.13	25.56	12.57	2.40	1.27
12.	Uttar Pradesh	97.76	82.81	14.95	6.88	7.37
13.	West Bengal	19.70	1.23	18.47	0.96	0.03
14.	Pondicherry	0.74	0.36	0.38	0.03	0.01
15.	A & N Islands	0.21	0.17	0.04	0.01	0
16.	Daman & Diu	0.07	0	0.07	0	0
17.	Lakshadweep	0.05	0.04	0.01	0.01	0
18.	Dadra & Nagar Haveli	0.13	0.12	0.01	0.01	0
	Total	**411.65**	**302.87**	**108.78**	**26.92**	**20.40**

It is seen from Table-2 that the State of Bihar has shown highest endemicity of over 17% followed by Uttar Pradesh, Kerala and Orissa. Andhra Pradesh and Tamil Nadu have about 10% endemicity. Goa showed the lowest endemicity of less than 1% followed by Lakshadweep (1.8%), Madhya Pradesh (above 3%) and Assam (about 5%). The latter two States have pockets showing high endemicity. Of the 20.4 million disease cases prevalent in the country, Uttar Pradesh and Bihar together contribute 13.2 million cases which constitute nearly two thirds of the total cases in the country.

Northern districts of Kerala, Tamil Nadu, Andhra Pradesh, coastal districts of Orissa and eastern parts of Uttar Pradesh showed mf rate above 6%. Small pockets in Maharashtra, Karnataka, Madhya Pradesh, Bihar, West Bengal and Assam have mf rate above 6%. The problem of filariasis is yet to be delimited in many districts in Maharashtra and a few districts in Karnataka, Tamil Nadu, Madhya Pradesh, Orissa, Uttar Pradesh, Bihar, West Bengal and Assam.

The present estimates reveal that bancroftian filariasis is endemic in 13 States and five Union Territories. The North Western States/UTs namely Jammu & Kashmir, Himachal Pradesh, Punjab, Haryana, Chandigarh, Rajasthan and Delhi and North Eastern States like Sikkim, Arunachal Pradesh, Nagaland, Meghalaya, Mizoram, Manipur and Tripura are known to be free from indigenously acquired filarial infection.

3.2. *B. malayi* nocturnal periodic infection

The infection is prevalent in the States of Kerala, Tamil Nadu, Andhra Pradesh, Orissa, Madhya Pradesh, Assam and West Bengal. The single largest tract of this infection is along the west coast of Kerala comprising the districts of Trichur, Ernakulam, Alleppey, Quilon and Thiruvananthapuram stretching over to an area of 1800 Sq. Kms The infection in the other six states is confined to a few villages only. Surveys undertaken recently in Kerala and in five villages revealed either diminution of foci or complete elimination of the parasite as well as the vector in many villages which were known to be endemic for *B. malayi* infection three decades back. The declining trend of this infection is due to 1). filling of *Mansonia* breeding places for real estate, 2). removal of host plants for lotus and fish culture 3). replacement of *Pistia stratiotes* by *Salvinia auriculata*, a less hospitable host plant for the principal vector 4). use of residual insecticide spray under NMEP which has markedly reduced *B. malayi* vectors and 5). increased use of microfilaricidal drugs as well as personal prophylactic measures due to better health education of general public about the causation of disease.

Presently 2.5 million people are exposed to the risk of *B. malayi* filariasis with about two Lakhs mf carriers and 1.25 Lakhs chronic cases.

Nocturnal sub-periodic *B. malayi* infection prevalent in some South East Asian countries has been found to be absent in India.

3.3. W. bancrofti diurnal sub-periodic infection

During 1958 the National Institute of Communicable Diseases (formerly known as Malaria Institute of India) conducted filaria survey in A & N Islands and found circulating mf in day time also. Subsequent surveys by NICD brought out the presence of diurnal sub-periodic *W. bancrofti* infection among the local inhabitants of Nicobar Group of Islands. The surveys brought out that a few islands namely Car Nicobar, Chowra and Kamorta - Noncowry Islands were found to be endemic for this infection. Since the survey being very limited, it has not been possible to know

the trend of this infection. Epidemiological evidence indicates the possibility of *Aedes (Finlaya) niveus* group of mosquitoes playing the vector role. The surveys show that this infection is limited to a few islands and the total population of these endemic islands is about 2000.

In India, both *W. bancrofti* and *B. malayi* are know to be anthroponotic. Extensive blood surveys of domesticated animals did not reveal the existence of zoonotic reservoir.

4. Control of Filariasis in India under NFCP

The first pilot project for the control of bancroftian filariasis was undertaken in a group of villages in Orissa from 1949 to 1954 through the conventional methods namely (i). mass drug therapy with diethylcarbamazine (DEC), (ii). recurrent anti-larval measures and (iii). residual insecticide spray as anti-adult measures. The pilot study revealed that each of the above methods had its own drawback but a multiple project using all the three methods concurrently was considered appropriate for the control of filariasis.

The National Filaria Control Programme (NFCP) was launched in 1955 for the control of bancroftian filariasis with the objectives: (a) to undertake delimitation surveys in known endemic areas (b) to undertake large scale control measures in selected areas and (c) to train personnel required to man the programme.

The control activities included anti-parasitic measures by instituting DEC therapy to total population at a dose of 4 mg per kg body weight per day for 5 consecutive days and anti-mosquito measures with 3 rounds of indoor dieldrin spray in rural areas and anti-larval measures using mosquito larvicidal oil or BHC in urban areas. The results of the control measures executed from 1955 to 1960 were assessed by the ICMR Assessment Committee. The major recommendations were:

1) Reorganisation of control units on the basis of population

2) Recurrent anti-larval measures

3) Establishment of new control units

4) Prevention of filariogenic condition in town extension and new township and

5) Adequate provision for disposal of sewage and sullage.

The 2nd Assessment Committee of ICMR was appointed in 1970 to assess the progress made by NFCP till that time and the salient recommendations were as follows:-

1) Selective microfilaria carrier therapy as a compliment to anti-larval measures.

2) Delimitation of the problem in un-surveyed districts

3) Regionalisation of control measures in contiguous areas

The NFCP was evaluated by ICMR Assessment Committee in 1982 and 1995 which made many recommendations for incorporation in the programme.

The DEC dosage adopted in the programme is 6 mg per kg body weight per day for 12 days. Besides MLO as larvicide organophosphorus larvicides namely fenthion and temephos have also been introduced in the programme in 1975.

Population protected under the National Filaria Control Programme and the set-up as on 31.12.1995

Sl. No	State/UT State/UT	Population Protected (in millions)	Filaria Control Units	Survey Units	Filaria Clinic
1.	Andhra Pradesh	5.35	29	2	4
2.	Assam	0.28	1	1	0
3.	Bihar	7.46	35	2	38
4.	Goa	0.33	4	0	6
5.	Gujarat	3.47	9	0	7
6.	Karnataka	0.64	6	1	19
7.	Kerala	3.95	16	2	9
8.	Madhya Pradesh	0.65	9	3	8
9.	Maharashtra	5.79	16	6	10
10.	Orissa	2.25	15	2	15
11.	Tamil Nadu	8.38	21	1	42
12.	Uttar Pradesh	6.51	29	2	34
13.	West Bengal	1.36	10	4	3
14.	Pondicherry	0.48	2	0	0
15.	A & N Islands	0.05	1	1	1
16.	Daman & Diu	0.03	2	0	2
17.	Lakshadweep	0.01	1	0	0
18.	Dadra & Nagar Haveli				
	Total	**46.99**	**206**	**27**	**198**

* Source: National Malaria Eradication Programme

5. DEC-Medicated Salt Trials in India

Based on the encouraging results obtained in pilot trials in Uttar Pradesh and Andhra Pradesh, the distribution of 0.1% DEC medicated salt to general public for one year was implemented in Lakshadweep comprising a population of 25,000 during 1976-77 which reduced microfilaria rate by 80% and circulating microfilaria by about 90%. The DEC medicated salt project with 0.2% concentration was concluded at Karaikal, Pondicherry which gave significant reduction in microfilaria. DEC pilot project was taken up during 1989 in selected villages of Kalakuchi Health District of Tamil Nadu. The results of DEC-medicated salt trials conducted in India are given in Table-3.

Table -3 DEC-Medicated Salt Trials in India

Sl. No.	Place	Study Popu-lation.	Year	months of salt distri-bution	Dose of DEC in salt	% age Reduction in	
						Mf rate	Circu-lating Mf
1.	Parbatpur (U.P)	204	1968	2	0.1%	61.0	94
2.	Nelaturu (A.P)	2489	1969	11	0.1%	86.0	99.3
3.	Mandapeta (A.P)	24094	1971	3	0.1%	34.4	69.0
4.	Darogakhera (U.P)	340	1972-73	3	0.3%	57.2	92.4
5.	Lakshadweep	26000	1976-79	27	0.1%0.15%	80.0	90.0
6.	Karaikal (Pondicherry)	130000	1980-84	46	0.15%0.2%	98.0	99.5
7.	Hill Settlements (Kerala)	1380	1981	12	0.4%	100.0	100.0

6. Revised control strategy

Fortunately, safe and cost-effective filariasis control methods have become available now. Instead of 12 day cumbersome drug regime with DEC, it is very encouraging to note that a single day treatment once a year has been found equally effective in reducing the transmission. The adoption of new strategies has eliminated lymphatic filariasis in countries like Japan, Taiwan, South Korea and Solomon Islands and markedly reduced filaria infection in China.

The new strategy is envisaged to encompass a four pronged attack on the disease. These are:

- A single day mass DEC treatment at a dose of 6 mg per kg body weight once a year.
- Management of acute and chronic filariasis episodes to reduce the morbidity and also remedy the massive swellings through referral services in selective centres.
- Information, Education and Communication (IEC) to inculcate individual/community based protective and preventive habits as an integral part of filaria control strategy.
- Continuation of existing control measures in NFCP towns to supplement single dose annual treatment with DEC.

The details of each methods are as follows:-

6.1 Annual single day mass chemo-therapy with Diethylcarbamazine (DEC)

6.1.1. Age-wise dose schedule

The single day mass DEC treatment will be as per the existing dose i.e. 6 mg/kg body weight. Since it is not feasible to weigh every individual in the field to calculate the exact amount of drug to be administered, it is convenient to adjust the dose schedule as per different age groups and this method is also followed in the programme.

Age group	Single dose of DEC
Adult 18 years & above	300 mg
12 to 17 years	225 mg
6 to 11 years	150 mg
2 to 5 years	75 mg
1 year	30 mg

As the pre-patent period of filarial infection is very long, infants are not included. Chronic cases especially illnesses among old people like heart problem, etc. are also to be excluded from the mass drug regimen.

6.1.2. National Filaria Day (NFD)

In the light of impetus accorded to some of the successful mass programmes launched through observation of national day throughout the country, it is in the right earnest that a National Filaria Day throughout India is proposed to be observed to achieve the national goal. The day shall coincide with working days of school going children who constitute as the prime group to be protected from the infection. The month of August will be appropriate period, seasonally advantageous in the beginning of academic year, and the inaugural day could be launched on 5th August, 1996 which

falls on the first working day of the week. The NFD is proposed to be observed for five years which falls on the following week days:-

5th August, 1996	-	Monday
5th August, 1997	-	Tuesday
5th August, 1998	-	Wednesday
5th August, 1999	-	Thursday
5th August, 2000	-	Saturday

6.1.3. Area and population to be covered

It is proposed to take up the new mass drug therapy initially in 13 highly endemic districts @ two districts each in six States namely Andhra Pradesh, Bihar, Kerala, Orissa, Tamil Nadu and Uttar Pradesh and one district in West Bengal. The names of selected districts and population are as follows:

Name of the state	Name of the district	Population as per 1995 estimate (millions)
1. Andhra Pradesh	1. East Godavari	4.91
	2. Srikakulam	2.49
2. Bihar	3. Darbhanga	2.51
	4. Siwan	2.17
3. Kerala	5. Alappuzha (Calicut)	2.11
	6. Kozhikode (Alleppey)	2.76
4. Orissa	7. Khurda	1.63
	8. Puri	1.41
5. Tamil Nadu	9. North Arcot	5.23
	10. South Arcot	4.87
6. Uttar Pradesh	11. Gorakhpur	3.30
	12. Varanasi	5.30
7. West Bengal	13. Purulia	2.22
Total	**13 districts**	**40.91**

Thus the total population to be covered in the first year in the 13 endemic districts will be 40.91 million.

During the second year, (i.e. 5th August, 1997), the NFD will be extended to 40 more districts covering all the 18 endemic States and UTs in addition to the 13 districts to be covered in the first year.

During the third year, the NFD will be extended to all the endemic districts in addition to 53 districts already brought under the ambit of mass drug therapy in the initial two years (i.e. 1996 and 1997).

The single day treatment once yearly for 2 to 3 years will continue throughout the filaria endemic districts (both urban and rural areas) in the country.

The efforts will continue for another 3 to 5 years by implementing DEC medicated salt regimen to achieve the national goal in the elimination of the disease from the country.

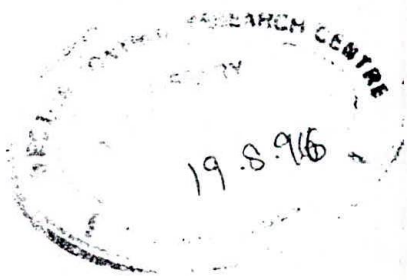
6.1.4. Nodal organisations to be involved in the first year of NFD

National Level

National Institute of Communicable Diseases and National Malaria Eradication Programme

State level

1.	Andhra Pradesh	i). The Directorate of Health Services, Andhra Pradesh
		ii). The Regional Filaria Training and Research Centre, NICD, Rajahmundry
		iii). The ROH & FW., Hyderabad
2.	Bihar	i). Directorate of Health Services
		ii). ROH & FW, Patna
		iii). RMRI/NICD Patna
3.	Kerala	i). The Directorate of Health Services
		ii). RFTRC/NICD Calicut
		iii). ROH & FW, Thiruvananthapuram
4.	Orissa	i). The Directorate of Health Services, Orissa
		ii). RMRC - Bhubaneshwar
		iii). ROH & FW, Bhubaneshwar
5.	Tamil Nadu	i). The Directorate of Public Health & Preventive Medicine.
		ii). Vector Control Research Centre, ICMR, Pondicherry
		iii). ROH & FW, Madras
6.	Uttar Pradesh	i). The Directorate of Health Services
		ii). RFTRC, NICD, Varanasi
		iii). ROH & FW, Lucknow
7.	West Bengal	i). Director of Health Services
		ii). ROH & FW, Calcutta
		iii). All Indian Institute of Hygiene & Public Health / School of Tropical Medicine, Calcutta.



After mutual consultations involving all the concerned organisations and the officials of Directorate of NICD and NMEP, the Nodal Officers will be identified at National, Regional, State, District and peripheral levels who will be responsible for successful implementation, monitoring and assessment of NFD and other related activities.

6.1.5. Financial aspects for mass drug therapy

The requirement of DEC to cover 40.91 million population in the initial year will be 163.6 million tablets of 50 mg each. An additional component of 50 per cent more tablets will have to be provided

to each state to meet the pipeline stocks and other exigencies. Thus about 250 million tablets will be required for the first year. The left over balance of tablets after the first year of NFD could be used in the successive years since the shelf life of DEC is five years. After the first year exercise, the requirement of drug for the second year could be worked out more precisely with marginal buffer stocks in addition to actual requirement.

The cost of DEC at the current rates is Rs.70/- per 1000 tablets of 50 mg each and the total cost of 250 million tablets will be Rs. 1.75 crores.

It has been recommended by the group that the Govt. of India bear the total expenditure of the drug & POL and 85% of IEC while the states shall meet other inputs. The normal activities of NFCP on pattern of sharing of expenditure between State and Centre will continue as in the past.

The total expenditure to be borne by GOI in the first year for the implementation of the New strategy is as follows:-

Estimated Expenditure (Rs.)

1.	DEC	1.75 crores
2.	POL @ Rs.2.0 Lakhs per district	0.26 Crore
3.	IEC @ Rs.5.0 Lakhs per one million population	2.05 Crore
	TOTAL	**4.06 crores**

6.1.6. Population coverage

It shall be ensured that at least 80 per cent of the target population is covered in the NFD with maximum coverage of 15 years and above age group who carry highest burden of infection.

6.1.7. Modus Operandi in NFD

The nodal organisation will have to prepare detailed calendar of activities for successful implementation of NFD. Voluntary Organisations (NGOs), Missionaries, Medical Colleges, Research organisations in Bio-Medical Sciences, Rural Development Departments, Panchayat Raj, AIR/TV as detailed under IEC, etc. will be fully involved right from the initial stage of the programme.

6.1.8. Broad calendar of activities

i. **January 4 & 5, 1996**: The workshop brought out the details of activities to be undertaken by different organisations involved in the new strategy including the tentative financial support.

ii. **February-March, 1996**: enquiries will be made from the Drug manufacturers whether they would be able to supply 250 million tablets of DEC of 50 mg each at a short notice in May, 1996 and the approximate price of the drug in bulk supply.

iii. **Feb-Mar., 1996:** Additional funds in the budget for NFD are to be provided by Govt. of India.

iv. **April, 1996**: BE Sanction by Govt. of India for NFD. the drug manufacturers will be requested to send quotations for supply of drug & placement of order.

v. **May, 1996**: The manufacturers will have to supply the drug to the consignee CMOs.

vi. **June, 1996**: The CMO will distribute the drug to PHC and PHCs will make the drug available in all the village panchayats through sub-centres.

vii. **August, 1996**: NFD will be observed in all the target villages and drug compliance report will be prepared by MO-PHCs and submit to CMO who in turn will submit the consolidated report to State Health Directorate with copies endorsed to ROH & FW and the Directorate. of NMEP/NICD.

6.1.9 Precautions to be observed for DEC therapy

i). It shall be ensured that the drug is swallowed by the community members in the presence of the identified drug administrator who could be a Panchayat Member/Local practitioner/School Teacher/Social Worker/DDC-FTD/MPW/Anganwadi Worker, etc.

ii). For school going children the drug should be administered during midday meal.

The drug should never be left with the community members for their consumption at a later stage lest the compliance should suffer.

iii). The community should be forewarned and prepared through IEC that the drug could likely to cause some mild side effects especially among the infected persons and these side affects are transitory which will subside in a couple of days and there shall not be any room for panicky by the community on account of side effects.

6.2. Case management

Control of filaria morbidity is the second weapon in the new strategy. Recent advances made in unravelling the pathogenesis of lymphatic filariasis exacerbating sub-clinical pathology have opened up new methods in specific management of manifestation like adenolymphangitis (ADL) and other associated disorders. Most of the cases with genital manifestations among males which constitute more than one fourth of bancroftian manifestations in the country could be remedied through surgical methods. Referral centres in District Hospitals, CHCs and even in PHCs, Medical Colleges, etc. will have to be developed to give relief or remission to filarial cases. Medical colleges with financial assistance from State/ICMR/UGC could organise re-orientation surgical training to Medical Officers to meet the growing needs of filaria patients. The inputs for case management shall be met within the sanctioned budget of respective organisations. WHO or International Organisations will be approached for special equipment and expertise in the recent advances made in this direction The Govt. of India may arrange necessary inputs for training of medical professionals through ICMR.

Initially the adequate referral centres may be created in the 13 target districts which will be extended to other districts in the second and third phases.

The State Health Authorities may draw a plan of action for accelerating cases management methodology.

6.3. Information, Education and Communication (IEC) strategy for NFD

6.3.1. Introduction

Health Education is a part of the success of any Health Programme. Information Education and Communication (IEC) plays an important role in bringing down the disease to a low level. In terms of Filaria, Health Education serves two purposes i). to inculcate individual/community protective & preventive habits as a part of Filaria control within the given socio-economic & environmental context and ii). to generate a demand for appropriate services from the health delivery system.

In the changing circumstances of epidemiology of diseases, and the environmental, a broad strategy for Health Education activity is given below:

6.3.2. General Objective

To create awareness among the members of the community about the causes, prevention, treatment and management of microfilaria carriers and disease manifestations leading to the reduction in morbidity.

6.3.3. Specific objectives

i). To create awareness on the reduction in the frequency of the contact between man and mosquito.

ii). to create awareness among the masses regarding methods which bring about reduction in the parasite load in the community.

iii). to create awareness on the methods which can bring about reduction in the mosquitogenic conditions leading to the lowering of the mosquito density in the area.

The following strategy is suggested:

6.3.4. Strategy

i). **Provider** - Faculty of Regional Family Welfare Training Centres and State Health Education Bureaux.

ii). **Receiver**- School children, Housewives, Mahila Mandals, Villagers, Small factory workers & different members of community.

The involvement of community opinion and non formal leaders will be of paramount importance in spread of awareness on filaria in community and in obtaining their co-operation in implementation and acceptance of control activities.

6.3.5. Mix Media

i). Mass Media: Through electronic media like T.V., Radio, Video quickies, Video on wheel & cables.

ii). Print Media - Posters, folders handbills, charts, flip charts, flip booklets, stickers, book markers for school children, postal prints etc.

iii). Other media - Through Exhibition, Folk dance Puppet show, Drama, Bhajan, Kirtan, Prabhat Pheri, etc.

6.3.6. Responsibilities

i). **Centre level**

- Press release
- Release of filaria literature
- Holding of Seminars
- Panel discussions of AIR & TV

ii). **State level**

The same activities mentioned above will be carried out at State level.

iii). **Peripheral level**

- Posters completion, essay competition
- Organisation of exhibition at school level
- Hoarding and banners at Melas (Carnivals)
- Clay models depicting filaria vector, life cycle, ant-larval treatment etc.
- Organisation of camps of opinion leaders
- Meetings with Mahila Samitis and Youth Clubs
- Youth clubs may organise street plays or puppet shows.
- Observation of National Filaria Day on 5th August, every year throughout the endemic parts in the country for creating awareness among masses and seeking community participation.

6.4. Monitoring and Evaluation

6.4.1. **Monitoring** The nodal organisations in each state shall monitor continuously on time schedules the efficiency of different implementing agencies at the grassroots level so as to institute immediate remedial measures.

6.4.2. **Assessment** The implementation of NFD and other components envisaged in the new strategy in respect of coverage and reduction in microfilaria rate and microfilaria load in the community will be assessed every year by the identified agencies.

6.4.3. **Evaluation** The successful implementation of the new strategy, planning & implementation, cost-effective ratio of the new strategy as against the conventional method of implementation will be evaluated by independent experts not directly associated with the new strategy.

The appropriate proforma and frequency of generation of data and submission of reports will be developed in January - February, 1996 by Experts identified by the Directorate. of NICD and NMEP in mutual consultation with other organisation.

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Report from Informal Consultation

on Albendazole Research

Findings in Lymphatic Filariasis

13-14 October 1998

Filariasis Elimination Programme (CDS/FIL)
Division of Control of Tropical Diseases
Communicable Diseases
World Health Organization, Geneva, Switzerland

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Donated Dr. P. K. Das.

Executive Summary

Those medical researchers responsible for the clinical trials of albendazole carried out to date in lymphatic filariasis came from **Africa, Asia and the Americas** to participate in this meeting, along with SmithKline Beecham's clinical developer of albendazole and members of the WHO* secretariat who have extensive experience in the use of albendazole and other drugs for filariasis and intestinal parasite infections. The meeting focussed on the safety and efficacy of albendazole (alone and in combination with either ivermectin or DEC) primarily in lymphatic filariasis. Conclusions and recommendations were formulated.

Safety of Albendazole and albendazole combinations

Numbers of individuals assessed: During the past 20 years it is estimated that albendazole has been given for intestinal helminth infections to 200-300 million people (mostly children) living in filariasis-endemic areas. If only 1% of these had active filarial infections [more likely to be 10-30%], still at least several million co-infected children would already have been treated. Safety experience with the drug has been excellent, and no adverse reactions have ever been attributed to concurrent filarial infections.

In the present studies (funded by WHO, SB, USAID, CDC and DBL) 2 728 men, women and children have been treated (~25% being microfilaraemic) under conditions of both clinical and laboratory safety monitoring (668 with albendazole alone, 1 850 with albendazole-plus-ivermectin and 116 with albendazole-plus-DEC). Another 1 110 children with intestinal parasites received the same regimens and were clinically monitored for safety. By the end of 1998 the total number monitored for safety will be almost 4 000. Drug dosages generally were: albendazole 400 mg, ivermectin 200 mcg/kg and DEC 6 mg/kg, given alone (albendazole) or in 2-drug combinations, but higher dosages and longer durations were used in ~100 patients.

Safety assessments: Clinically, single-dose albendazole, alone or co-administered, was extremely well tolerated. Systemic reactions of fever, headache and myalgia in microfilaraemic patients treated with albendazole were seen only when albendazole was co-administered with one of the microfilaricidal drugs DEC or ivermectin (as these reactions are caused by host responses to the dying microfilariae, and albendazole appears to be minimally or not microfilaricidal). Albendazole alone did not induce these systemic reactions and when co-administered did not increase their frequency or severity. Localized reactions (inflammatory nodules indicative of death of adult filarial worms) were seen occasionally after single-dose treatments and were generally well tolerated, but such reactions were frequent and severe in the 15 men treated with high-dose (800 mg) albendazole daily for 3 weeks. Blood chemistry, haematologic and renal indices were unaffected by albendazole (either alone or in combination), except for mild, self-limited liver transaminase elevations regularly seen in 10-20% of individuals treated with albendazole for any indication.

Efficacy of Albendazole in Lymphatic Filariasis

Numbers of individuals assessed: Completed studies have provided data for microfilaraemic patients treated with albendazole alone (n = 130), albendazole-plus-ivermectin (n = 160) and albendazole-plus-DEC (n = 45). Studies currently underway will add data from about 165, 1 070 and 211 patients to each of these three groups, respectively. Additionally, data from treated patients whose infections are defined by circulating-antigen positivity in the absence of microfilaraemia will shortly be available from ~100-400 individuals on each of these

* See overall List of abbreviations (p. 19)

single-dose treatment regimens. Drug dosages were those described above; all received only 'single-dose' regimens except for the 15 receiving high-dose albendazole daily for 3 weeks.

Efficacy assessments: Albendazole was not demonstrably microfilaricidal when administered in single-dose regimens (though it does appear to reduce microfilaraemia by inhibiting adult worms from shedding additional microfilariae into the circulation). Therefore, assessment of anti-filarial effects of albendazole alone must be based on long-term 'suppression' of microfilaraemia (after the 'natural' clearance [death] of microfilariae over 6-12 months) and on decreasing levels of circulating antigen.

In repeated high doses, albendazole appears curative for *W. bancrofti* infections. As a single dose it demonstrated a sterilizing effect on adult *W. bancrofti* (but not *B. malayi*) worms, that was either statistically significant or showed the same trend in all studies. When administered in combination with ivermectin or DEC it enhanced suppression of microfilaraemia (probably because of the activity against adult worms) for both *W. bancrofti* and *B. malayi* infections.

Overall Conclusions

1. 'Single-dose' combinations of albendazole plus either ivermectin or DEC were found to be equally safely administered to patients with lymphatic filariasis (and other individuals living in endemic communities) as single doses of ivermectin or DEC alone.

2. 'Single-dose' 2-drug combinations of albendazole plus either ivermectin or DEC are superior in efficacy to single drug treatment for decreasing microfilaraemia in lymphatic filariasis.

3. Albendazole alone has a killing or sterilizing activity on lymphatic filarial adult worms.

4. There appears to be no reason why large-scale programmes to interrupt transmission of lymphatic filariasis should not be based on single-dose treatment regimens based on albendazole plus either DEC or ivermectin.

5. Combination treatment for lymphatic filariasis creates programmatic opportunities for coordinated public health interventions.

Report from Informal Consultation on Albendazole Research Findings in Lymphatic Filariasis

13-14 October 1998, WHO, Geneva

Introduction

It is the introduction of dramatically effective treatment regimens to decrease microfilaraemia that is most responsible for the recent designation of lymphatic filariasis as a disease that can be eliminated and for the Resolution by the World Health Assembly to eliminate lymphatic filariasis as a public health problem globally[1]. The observation that single-dose ivermectin produced a rapid and sustained reduction of microfilaraemia in lymphatic filariasis[2] was followed by studies which showed that single-dose diethylcarbamazine (DEC) was equally effective in the long-term[2]. The microfilaricidal efficacy of combinations of ivermectin and DEC proved to be greater than with either of the two drugs given alone[3]. Most recently, combinations of albendazole with ivermectin or DEC have been shown to be equally effective as the combination of ivermectin with DEC in the long-term reduction of microfilaraemia[4]. Albendazole has the additional benefit of its safe use in areas endemic for onchocerciasis and loiasis and its ability to reduce prevalence and intensity of intestinal worm infections[5].

Purpose of the Consultation

The main purpose of the Informal Consultation was to examine critically all the data available on studies, both published and unpublished, carried out on the safety, tolerability and efficacy of albendazole and its combinations with ivermectin or DEC in lymphatic filariasis. It also looked at studies, both completed and ongoing, on the efficacy of albendazole combinations in the treatment of intestinal nematode infections.

Those medical researchers responsible for the clinical trials of albendazole in lymphatic filariasis came from Africa, Asia and the Americas to participate in this meeting, along with SmithKline Beecham's clinical developer of albendazole and members of the WHO secretariat who have extensive experience in the use of albendazole and other drugs for filariasis and intestinal parasite infections (see Appendix 1). The meeting focussed on the safety and efficacy of albendazole (alone and in combination with either ivermectin or DEC) primarily in lymphatic filariasis (see Appendix 2). Conclusions and recommendations were formulated (see below).

Research findings (see Table)

Macrofilaricidal activity of albendazole has been demonstrated against sub-periodic *Brugia malayi* in the leaf monkey[6] and against *Brugia pahangi* in jirds[10].

Details of studies carried out on the safety and efficacy of albendazole and its combinations in lymphatic filariasis in humans are summarized in the Table. In the first study, the comparative efficacy of high doses of albendazole (400 mg bid for 21 days) and DEC (6 mg/kg per day in divided doses given for the same period) was evaluated in asymptomatic microfilaraemic men with bancroftian filariasis[7]. Multiple high dose albendazole reduced microfilaraemia less than DEC did but appeared to have greater macrofilaricidal activity, as

11 of 15 patients treated with albendazole had "scrotal syndrome" with development of scrotal nodules (indicative of adult worm death) in the second week of treatment. The "scrotal syndrome" was self-limited in most cases, but 3 patients required some analgesic support and rest. Patients with scrotal involvement also showed systemic effects such as fever, chills, anorexia and nausea. Multiple high-dose albendazole was clearly unsuitable as a treatment regimen for bancroftian filariasis, but given the macrofilaricidal activity and microfilaraemic reductions seen with albendazole and given the remarkable microfilaricidal efficacy of other single-dose regimens, it seemed logical to investigate the antifilarial activity of *single-dose* albendazole, especially in combinations with either ivermectin or DEC.

The first of these studies was carried out in Sri Lanka in a 'blinded' trial in which the safety, tolerability and filaricidal efficacy of single-dose albendazole 600 mg (alb 600) alone or in combination with DEC 6 mg/kg (alb 600 / DEC 6) or ivermectin 400 mcg/kg (alb 600 / iver 400) were compared with a single-dose combination of DEC 6 mg/kg and ivermectin 400 mcg/kg (DEC 6 / iver 400). Prior to its commencement, however, a safety study was conducted on 10 'healthy' amicrofilaraemic volunteers (unpublished). Five were given alb600 / DEC 6 and 5 alb600 / Iver400. The drugs were well tolerated and none of the volunteers showed any clinical adverse effects during the 4 week period following treatment. A comprehensive set of laboratory safety tests was carried out pre-treatment and on days 7, 14 and 28 (where necessary). Four patients (2 in each group) showed slight elevations of liver enzymes on day 14. The interpretation was complicated, however, by concurrent consumption of alcohol by the volunteers; enzymes returned to normal levels by day 28. One patient who had pre-test electrocardiographic evidence of a Grade II A-V block continued to be clinically normal and showed no additional ECG changes after treatment. The albendazole combinations therefore appeared to be safe.

In the study on asymptomatic microfilaraemic patients[4] all 4 treatments, including alb 600 alone, significantly reduced mf counts, but alb 600 / iver 400 was the most effective regimen for clearing mf from night blood; 9 of 13 subjects (69%) were amicrofilaraemic by membrane filtration 15 months after treatment. Alb 600 / DEC 6 brought about a slow reduction of microfilaraemia initially but at the ninth month and thereafter there was no significant difference between the % pre-treatment mf levels in the alb 600 / iver 400, alb 600 / DEC 6 and DEC 6 / iver 400 treatment groups. At 15 months post-treatment the mf/ml level expressed as a % of the pre-treatment levels in these 3 combination regimens were below 1.5%. Filarial antigen tests suggested that all 4 treatments had significant activity against adult *W. bancrofti* but alb 600 / DEC 6 had the greatest activity according to this test, with antigen levels decreasing by 77%. Early clinical assessments and laboratory safety screens were hospital-based. All 4 regimens were well tolerated and clinically safe. Systemic adverse effects such as fever (in 58% of the patients), headache (in 60%), myalgia (in 48%) and weakness (in 46%) were no different from those seen in Sri Lankan patients in previous studies using ivermectin and DEC for treatment of asymptomatic microfilaraemia. These adverse effects were transient, lasting no more than 48 hours and, with one exception, required no intervention other than the administration of paracetamol in a few cases. One patient treated with alb 600 / iver 400 developed wheezing with breathlessness about 36 hours after treatment. This was controlled with a single-dose of hydrocortisone 100 mg IV. The systemic adverse effects appeared to be correlated to the pre-treatment mf level and *not* to the individual treatment groups. Mild elevation of liver enzymes were seen in 25-35% of patients in all 4 groups; levels returned to within normal limits by day 14. Three patients in the alb 600 / DEC 6 group developed small scrotal nodules by 48 hours following treatment. The nodules regressed spontaneously by 2 to 4 weeks.

All 4 treatment regimens were thus well tolerated, clinically safe and resulted in significant reduction of microfilaraemia. Both albendazole combinations were better than albendazole alone. It was possible to determine the mf levels in 34 of the 50 patients at 30 months post-treatment; the mean mf levels in all 4 groups were unchanged from to those observed at 15 months (unpublished).

In a similar ongoing study in Sri Lanka using *standard* doses of albendazole (400 mg), ivermectin (200 mcg/kg) and DEC (6 mg/kg), 47 male asymptomatic microfilaraemic patients were randomly allocated to one of 3 treatment regimens; namely, albendazole 400mg with ivermectin 200 mcg/kg, albendazole 400 mg with DEC 6 mg/kg, and albendazole 600 mg/kg with ivermectin 400 mcg/kg (for comparison). A follow-up of 21 months after treatment has shown clinical and laboratory safety and microfilaricidal efficacy to be very similar to that observed in the previous study with higher doses of albendazole and ivermectin (manuscript in preparation).

A randomised placebo-controlled comparison of ivermectin and albendazole alone and in combination with *W. bancrofti* microfilaraemia was carried out in Haitian children[8]. One hundred and thirteen microfilaraemic children (mean age 7.8 years) were randomly assigned to one of the 4 single-dose treatments; namely, placebo, ivermectin 200-400 mcg/kg, albendazole 400 mg or albendazole 400 mg with ivermectin 200-400 mcg/kg. Follow-up blood examinations for microfilariae were carried out 4 months after treatment. The post-treatment mf concentrations did not differ significantly between placebo and albendazole treatment (4 months likely being too early to detect any microfilaricidal [or microfilaraemia-reducing] effect in the albendazole treated group); however, there were significant differences between the placebo and both the ivermectin and the albendazole / ivermectin combination. The reduction in mf concentration was significantly greater for children who received the combination than for those who received ivermectin alone. Adverse reactions following treatment were generally mild and well tolerated but fever, headache, myalgia and cough were reported significantly more frequently among children who received ivermectin alone or albendazole / ivermectin combination compared to the other two groups. However, no significant differences were found in the frequency or severity of symptoms between children who were treated with ivermectin alone and those who received ivermectin with albendazole. The results thus showed that for children with *W. bancrofti* microfilaraemia, combined treatment with albendazole and ivermectin was more effective than ivermectin alone with no measurable increase in severity of adverse reactions.

In a study of *Brugia malayi* patients in India, 48 asymptomatic microfilaraemic adults and children of both sexes were randomly allocated to receive one of the following 3 treatments: ivermectin 200 mcg/kg with DEC 6 mg/kg, albendazole 400 mg with DEC 6 mg/kg, and albendazole 400 mg with ivermectin 200 mcg/kg. All patients were hospitalized for drug administration and initial safety assessments. The systemic adverse effects such as fever, headache and myalgia and laboratory screens were similar to those observed in previous studies with brugian filariasis. Local inflammatory reactions were not observed. At the end of the first year microfilarial densities showed greater than 98% reductions from pre-treatment in the DEC/ivermectin and the DEC/albendazole treatment groups. With ivermectin / albendazole the reduction was 90%. This study is now in its second year.

In a double-blind, placebo-controlled trial in a *W. bancrofti* endemic community in Ghana involving 1 246 (340 being mf positive) men, women and children over 6 years of age (pregnant women were excluded), 4 treatment regimens were used: albendazole 400 mg alone, ivermectin 150 mcg/kg alone, a combination of the two, and placebo. Both the ivermectin alone and the albendazole / ivermectin treatment groups showed profound statistically significant

reductions of microfilaraemia up to 12 months after treatment, with the reduction being significantly greater for the combined therapy only at 3 months. Albendazole alone resulted in a progressive decline in microfilarial density but which still had not reached statistical significance by 12 months. Mild adverse effects (fever, myalgia) occurred beginning at 18 hours and disappeared by 3 to 4 days without intervention.

In Tanzania an ongoing two-period crossover, double-blind, placebo-controlled trial has examined the safety and efficacy of a combination of albendazole and ivermectin treatment in 20 patients with dual infections of bancroftian filariasis and onchocerciasis and 25 patients with bancroftian filariasis alone. Twenty males between the ages of 15 and 55 years showing *W. bancrofti* mf counts of $\geq$ 100 mf/ml blood and $\geq$ 5 *O. volvulus* mf/skin snip without chronic manifestations associated with bancroftian filariasis or onchocerciasis were admitted to hospital for 14 days. They received albendazole 400 mg with ivermectin 150 mcg/kg or placebo and observed for 7 days. On day 8 a crossover of treatment regimens was effected and all patients are being followed up. The results of clinical and laboratory safety assessments on the first 10 patients were similar to those seen in other studies. The trial is still ongoing and the code remains intact. Ninety per cent of the treated individuals were amicrofilaraemic at 30 days post-treatment. A similarly designed study is also underway with 25 individuals having bancroftian filariasis alone.

In Sri Lanka a field study involving 200 asymptomatic *W. bancrofti* microfilaraemic adults and children of both sexes has commenced. These patients have been randomly allocated to receive one of 4 treatment regimens, albendazole 400 mg alone, DEC 6 mg/kg alone, albendazole 400 mg / DEC 6 mg/kg and albendazole 400 mg / ivermectin 200 mcg/kg combinations. The safety and microfilaricidal efficacy of these regimens are being monitored. So far more than a hundred patients have been treated with no significant adverse effects.

In Papua New Guinea, studies to examine the efficacy of DEC 6 mg/kg alone and DEC 6 mg/kg in combination with ivermectin 400 mcg/kg in interruption of *W. bancrofti* infections are now in their fifth year. After two annual treatments villages where DEC / ivermectin was given showed a greater reduction in mf prevalence and intensity (~90-98% reduction) than those where DEC alone was given (~80-90% reduction); with respect to transmission, the ATP in villages where DEC / ivermectin was used had reductions of ~80-95% and those where DEC alone was used showed a ~70-80% decrease after 3 cycles of annual treatment. The safety and efficacy of albendazole, DEC and combinations of these drugs with ivermectin will now be studied in previously untreated villages.

Two studies have compared the efficacy of albendazole and its combinations with ivermectin or DEC against intestinal nematode infections. In a randomised placebo-controlled study in Haiti involving 853 children (mean age 7 years) of both sexes the anthelmintic efficacy and nutritional benefits of treatment with albendazole 400 mg alone, ivermectin 200-400 mcg/kg alone, a combination of albendazole / ivermectin, and placebo were compared[5]. The combination treatment reduced the prevalence of Trichuris infections significantly more than either drug alone. Only combination therapy resulted in nutritional benefits not found with either drug alone. The second study[9] of 176 children between the ages of 4 and 14 years of both sexes compared the efficacy of albendazole 400 mg alone, albendazole 400 mg with DEC 6 mg/kg, and albendazole 400 mg with ivermectin 200 mcg/kg against *Trichuris trichiura* infections. Fifty-five children with Trichuris infection showed a 'cure rate' of 79.3%, 3 weeks after treatment with albendazole / ivermectin combination which was significantly greater than that seen with the other two treatments. Thus, these two studies carried out concurrently in

Haiti and Sri Lanka have shown similarly enhanced efficacy against Trichuris infection with the albendazole / ivermectin combination treatment.

Three further studies in Ecuador, Gabon and the Philippines are underway to evaluate the comparative efficacy of single administrations of albendazole 400 mg, ivermectin 200 mcg/kg, DEC 6 mg/kg and their combinations against intestinal nematodes.

Safety of albendazole and albendazole combinations

Numbers of individuals assessed: During the past 20 years it is estimated that albendazole has been given for intestinal helminth infections to 200-300 million people (mostly children) living in filariasis-endemic areas. If only 1% of these had active filarial infections [more likely to be 10-30%], still at least several million co-infected children would already have been treated. Safety experience with the drug has been excellent, and no adverse reactions have ever been attributed to concurrent filarial infections.

In the present studies (funded by WHO, SB, USAID, CDC and DBL) 2 728 men, women and children have been treated (~25% being microfilaraemic) under conditions of both clinical and laboratory safety monitoring (668 with albendazole alone, 1 950 with albendazole-plus-ivermectin and 116 with albendazole-plus-DEC). Another 1 110 children with intestinal parasites received the same regimens and were clinically monitored for safety. By the end of 1998 the total number monitored for safety will be almost 4 000. Drug dosages generally were: albendazole 400mg, ivermectin 200 mcg/kg and DEC 6 mg/kg, given alone (albendazole) or in 2-drug combinations, but higher dosages and longer durations were used in ~100 patients (see Table).

Safety assessments: Clinically, single-dose albendazole, alone or co-administered, was extremely well tolerated. Systemic reactions of fever, headache and myalgia in microfilaraemic patients treated with albendazole were seen only when albendazole was co-administered with one of the microfilaricidal drugs DEC or ivermectin (as these reactions are caused by host responses to the dying microfilariae, and albendazole appears to be minimally or not microfilaricidal). Albendazole alone did not induce these systemic reactions and when co-administered did not increase their frequency or severity. Localized reactions (inflammatory nodules indicative of death of adult filarial worms) were seen occasionally after single-dose treatments and were generally well tolerated, but such reactions were frequent and severe in the 15 men treated with high-dose (800 mg) albendazole daily for 3 weeks. Blood chemistry, haematologic and renal indices were unaffected by albendazole (either alone or in combination), except for mild, self-limited liver transaminase elevations regularly seen in 10-20% of individuals treated with albendazole for any indication.

Efficacy of Albendazole in Lymphatic Filariasis

Numbers of individuals assessed: Completed studies have provided data for microfilaraemic patients treated with albendazole alone (n = 130), albendazole + ivermectin (n = 160) and albendazole + DEC (n = 45). Studies currently underway will add data from about 165, 1 070 and 211 patients to each of these three groups, respectively. Additionally, data from treated patients whose infections are defined by circulating-antigen positivity in the absence of microfilaraemia will shortly be available from ~100-400 individuals on each of these single-dose treatment regimens. Drug dosages were as described above; all received only 'single-dose' regimens except for the 15 receiving high-dose albendazole daily for 3 weeks (see Table).

Efficacy assessments: Albendazole was not demonstrably microfilaricidal when administered in single-dose regimens, though it does appear to reduce microfilaraemia by inhibiting adult worms from shedding additional microfilariae into the circulation. Therefore, assessment of anti-filarial effects of albendazole alone must be based on long-term 'suppression' of microfilaraemia (after the 'natural' clearance [death] of microfilariae over 6-12 months) and on decreasing levels of circulating antigen.

Albendazole in repeated high doses appears curative for *W. bancrofti* infections. As a single dose it demonstrated a killing or sterilizing effect on adult *W. bancrofti* (but not *B. malayi*) worms, that was either statistically significant or showed the same trend in all studies. When administered in combination with ivermectin or DEC it enhanced suppression of microfilaraemia (probably because of the activity against adult worms) for both *W. bancrofti* and *B. malayi* infections

Overall Conclusions

1. 'Single-dose' combinations of albendazole plus either ivermectin or DEC were found to be equally safely administered to patients with lymphatic filariasis (and other individuals living in endemic communities) as single doses of ivermectin or DEC alone.

2. 'Single-dose' 2-drug combinations of albendazole plus either ivermectin or DEC are superior in efficacy to single drug treatment for decreasing microfilaraemia in lymphatic filariasis.

3. Albendazole alone has a killing or sterilizing activity on lymphatic filarial adult worms.

4. There appears to be no reason why large-scale programmes to interrupt transmission of lymphatic filariasis should not be based on single-dose treatment regimens using albendazole plus either DEC or ivermectin.

5. Combination treatment for lymphatic filariasis creates programmatic opportunities for coordinated public health interventions.

Recommendations

1. The safety data accumulated during studies of albendazole in lymphatic filariasis should be collected, reviewed and prepared in a form suitable for publication/registration.

2. The numbers of patients treated with the albendazole-containing combinations in lymphatic filariasis should be expanded in further studies.

3. The first national programmes using these combinations to eliminate lymphatic filariasis should undertake active safety monitoring during the first 4 weeks after treatment to expand the safety evaluation data.

4. Pharmacokinetic data should be obtained on the albendazole-plus-ivermectin and albendazole-plus-DEC co-administration regimens.

Single-dose and multiple-dose regimens of albendazole should be studied to define the safest macrofilaricidal regimen for *curing* infections in individuals.

6. The effectiveness of albendazole-containing regimens in reversing the pathology induced by the filariae should be investigated.

7. Research should be undertaken to develop markers to identify potential 'resistance' of the filariae to all the anti-filarial drugs.

8. Efforts to coordinate the activities of lymphatic filariasis elimination programmes with other related public health activities should be enhanced.

9. Additional studies should be carried out, especially in Africa, on the comparative efficacy of ivermectin alone and its combination with albendazole against bancroftian filariasis in onchocerciasis and loiasis endemic areas.

10. The efficacy of albendazole combinations with ivermectin or DEC to interrupt transmission of lymphatic filariasis should be investigated in large-scale trials.

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Table: Research studies on the safety and efficacy of albendazole and its combinations with ivermectin or DEC in lymphatic filariasis **

Albendazole alone in lymphatic filariasis							
Investigator	**Country**	**Type of study**	**Species**	**Dose**	**No. of pts**	**Safety assessment**	**Remarks**
Jayakody	Sri Lanka	Multidose	*Wb*	400 A bid x 21d	15	+	Published [7]
Ismail	Sri Lanka	Single dose	*Wb*	600 A	12	+	Published [4]
Addiss/Beach	Haiti	Single dose	*Wb* + Helm	400 A	219 (29 mf+)	+	Published [5,8]
Shenoy	India	Single dose	*Bm*	400 A	3	+	Ms in preparation
Dunyo	Ghana	Single dose	*Wb*	400 A	369 (71 mf+)	+	Ms in preparation
Weerasooriya	Sri Lanka	Single dose	*Wb*	400 A	50	Clinical	Ongoing (for 6 months)
Beach	Haiti	Single dose	*Wb*	400 A	400	+	To start 11/98
Kazura	PNG	Single dose	*Wb*	400 A	75	Clinical	To start 12/98

** See List of abbreviations (p. 19)

Combination of albendazole with ivermectin

Investigator	Country	Type of study	Species	Dose	No. of pts	Safety assessment	Remarks
Ismail	Sri Lanka	Single dose	None (normal volunteers)	600 A / 400 I	5	+	Unpublished
Ismail	Sri Lanka	Single dose	*Wb*	600 A / 400 I	13	+	Published [4]
Addiss/Beach	Haiti	Single dose	*Wb* + Helm	400 A / 200 I	218 (24 mf+)	+	Published [5,8]
Ismail	Sri Lanka	Single dose	*Wb*	600 A / 400 I, 400 A / 200 I	16 + 16	+	Ongoing (x 21 months)
Ismail	Sri Lanka	Single dose	Trichuris		55	Clinical	In press [9]
Shenoy	India	Single dose	*Bm*	400 A / 200 I	16	+	Ms in preparation
Shenoy	India	Repeat single dose	*Bm*	400 A / 200 I	16	+	Ongoing (for 6 months)
Dunyo	Ghana	Single dose	*Wb*	400 A / 150 I	371 (75 mf+)	+	Ms in preparation
Dunyo	Ghana	Repeat single dose	*Wb*	400 A/ 150 I	1 184	Clinical	Ongoing (for 2 months)
Makunde	Tanzania	Single dose crossover	*Wb* + *Ov*	20	19	+	Ongoing (for 4 months)
Makunde	Tanzania	Single dose crossover	*Wb*	25	20	+	Ongoing (for 4 months)
Weerasooriya	Sri Lanka	Single dose	*Wb*	400 A / 200 I	50	Clinical	Ongoing (for 6 months)
Espinel	Ecuador	Single dose	Helm	400 A	200	Clinical	Ongoing (for 3 months)
Belizario	Philippines	Single dose	Helm	400 A / 200 I	200	Clinical	Ongoing (for 3 months)
Lenoble	Gabon	Single dose	Helm	400 A / 200 I	200	Clinical	Ongoing (for 5 months)
Kazura	PNG	Single dose	Wb	400 A / 200 I	75	Clinical	To start 12/98

Combination of albendazole with DEC

Investigator	Country	Type of study	Species	Dose	No. of pts	Safety assessment	Remarks
Ismail	Sri Lanka	Single dose	Normal volunteers	600 A / 6 D	5	+	Unpublished
Ismail	Sri Lanka	Single dose	*Wb*	600 A / 6 D	13	+	Published [4]
Ismail	Sri Lanka	Single dose	*Wb*	600 A / 6 D	16	+	Ongoing (for 21 months)
Ismail	Sri Lanka	Single dose	Trichuris	400 A / 6 D	47	Clinical	In press [9]
Shenoy	India	Single dose	*Bm*	400 A / 6 D	16	+	Ms in preparation
Shenoy	India	Repeat single dose	*Bm*	400 A / 6 D	16	+	Ongoing (for 6 months)
Weerasooriya	Sri Lanka	Single dose	*Wb*	400 A / 6 D	50	Clinical	Ongoing (for 6 months)
Espinel	Ecuador	Single dose	Helm	400 A / 6 D	200	Clinical	Ongoing (for 3 months)
Belizario	Philippines	Single dose	Helm	400 A / 6 D	200	Clinical	Ongoing (for 3 months)
Beach	Haiti	Single dose	*Wb*	400 A / 6 D	400	+	To start 11/98
Kazura	PNG	Single dose	*Wb*	400 A / 6 D	75	Clinical	To start 12/98

Appendix 1

Informal Consultation on Albendazole Research Findings in Lymphatic Filariasis 13-14 October 1998, Room L 14, WHO, Geneva

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List of abbreviations

A	albendazole (in Table)
Alb	albendazole
B. malayi	*Brugia malayi*
Bm	*Brugia malayi*
CDC	Centers for Disease Control and Prevention
D	diethylcarbamazine (in Table)
d	day
DBL	Danish Bilharziasis Laboratory
DEC	diethylcarbamazine
I	Ivermectin (in Table)
Iver	Ivermectin
mcg	microgram
mg	milligram
SB	SmithKline Beecham
USAID	United States Agency for International Development
W. bancrofti	*Wuchereria bancrofti*
Wb	*Wuchereria bancrofti*
WHC	World Health Organization

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Eliminate Filariasis: Attack poverty

The Global Alliance to Eliminate Lymphatic Filariasis
Proceedings of the First Meeting

Santiago de Compostela, Spain
4–5 May 2000

A GreenLight from the Global Alliance

Report prepared by the
Department of Communicable Diseases Control,
Prevention and Eradication, World Health Organization
Geneva, 2000

The World Health Organization would like to express its appreciation to the partners that supported this meeting: Merck & Co., Inc., SmithKline Beecham and the Government of the United Kingdom, with special thanks for the generous hospitality of the Government of Spain, as well as the Province of Galicia, which offered conference facilities, services and accommodation.

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Contents*

List of Acronyms v
Message from the Director-General vi
Executive Summary vii

Mounting a massive effort against the diseases of poverty

Opening Ceremony 1

WHO Welcome Address 1
Address by His Excellency D. Fernando Riquelme Lidon, Spanish Secretary of State 2
Video Welcome: WHO Director-General Dr Gro Harlem Brundtland 2
Address by Mr Enrique Castellon Leal, Spanish Vice-Minister of Health 2
Address by Mr Manuel Fraga Iribarne, the President of the Galician Government 2
Address by the Government of the United Kingdom (DFID) 3

The Programme to Eliminate Lymphatic Filariasis 5

Lymphatic Filariasis: A Global Overview 5
Report from the Technical Advisory Group 9
Report from the Programme Review Group 10
Regional and Country Reports 11
African Region 11
Region of the Americas 12
Eastern Mediterranean Region 14
South-East Asia Region 15
Western Pacific Region 16
Private Sector Partners: LF and the Case of a Gold Mine Manager in Papua New Guinea 19;
Video Synopsis of SmithKline Beecham video 20

Working Groups' Discussions 21

Working Group 1: Addressing Global Alliance Communications and Information Needs 21
Working Group 2: Seeking Support (including funding) 22
Working Group 3: Defining the Role of Non-Governmental Development Organizations (NGDOs) in National Programmes to Eliminate LF 22
Working Group 4: Meeting the Needs of Countries: How the Alliance can best support more effective country action 23
Working Group 5: Identifying Critical Elements for Successful LF Programmes 24
Working Group 6: Maximizing Regional Coordination 25

* The table of contents reflects the agreed-upon agenda of the Santiago meeting.

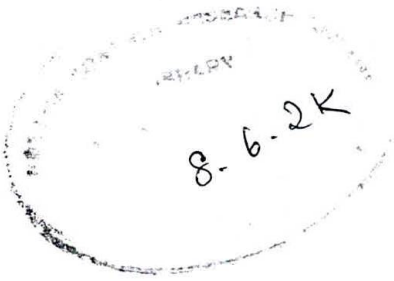
Closing Statements 26

SmithKline Beecham 26
Merck & Co., Inc. 26
The World Bank 26
Department for International Development, United Kingdom 26
Inter-church Medical Assistance (representing NGDOs) 27
World Health Organization 27
Rapporteur's Round-up 28
Meeting Chairperson 28

Annex: List of Participants 29

30

List of Acronyms



ADL	Acute adenolymphangitis
APOC/OCP	African Programme for Onchocerciasis Control/Onchoceciaisis Control Programme.
CDC	US Centers for Disease Control and Prevention
CEE	Control, Eradication and Elimination
CFF	confirmed filariasis free
DEC	Diethylcarbamazine (one of the drugs used against lymphatic filariasis)
DFID	Department for International Development, United Kingdom
DOH	Department of Health
HDI	Health and Development International
ICT	immunochromatographic test
IEC	information, education, communication
IMA	Interchurch Medical Association
LCS	large country strategy for elimination of filariasis (countries with populations greater than 500 000)
LF	lymphatic filariasis
MDP	Mectizan® Donation Program (which oversees the donation of Mectizan® (ivermectin) for use in onchocerciasis and lymphatic filariasis programmes on behalf of Merck & Co., Inc.)
MML	Misima Mines Ltd.
MoH	(national) ministry of health
NFCP	National Filiarisis Control Programme
NGDO	Non-governmental development organization
PELF	Pacific Countries Elimination of Lymphatic Filariasis
PHC	primary health care
PIS	Pacific Island strategy for elimination of filariasis (countries with populations less than 500 000)
SB	SmithKline Beecham, plc. (the pharmaceutical company donating albendazole for use towards the elimination of lymphatic filariasis)
SPC	Pacific Commission
TCC	Technical Coordination Committee
TDR	Tropical Disease Research
UN	United Nations
UNDP	United Nations Development Programme
UNFPA	United Nations Population Fund
UNICEF	United Nations Children's Fund
WHO	World Health Organization

Message from the Director-General

The world has committed to halving the number of people living in poverty by 2015. To succeed, we must strengthen our focus on how health actions can help reduce poverty. Bad health is an important factor in keeping people locked in poverty. But health is, at the same time, part of the solution – a new and potentially powerful exit route out of poverty. The elimination of lymphatic filariasis is one good example.

Of all the partners in the Global Alliance, none can eliminate lymphatic filariasis on its own. When we met in October 1999 in Geneva at WHO for the dedication of the onchocerciasis statue, many recalled the difficult times experienced in setting up the onchocerciasis partnership. I am confident, however, that in the LF Global Alliance each organization has a special strength and each has a special role. We complement each other and that is the basis for a sound partnership. Together we will succeed.

The tasks ahead are clear: the programmes in the countries will be integrated with other disease control activities of the Ministries of Health. For example, the lymphatic filariasis elimination programme may be joined with leprosy activities in some countries. It may be joined with intestinal parasite control in others. And it may be joined with onchocerciasis activities in yet others. Millions of people will need medication to interrupt transmission of the disease; and millions more, already infected, will need help to alleviate their pain and suffering.

By focusing our activities on the most essential and the most effective interventions, we can reach our common goal of interrupting transmission. At the same time we will make a large and most immediate impact on poverty.

In 1998, SmithKline Beecham agreed to donate its drug albendazole free-of-charge until the disease is eliminated. This is likely to be a donation of between 4-6 billion tablets over a 20-year period. Merck & Co., Inc. also pledged to expand its Mectizan® Donation Program for onchocerciasis to cover the treatment of lymphatic filariasis in all areas where the two diseases occur together.

Some people have suggested that Industry-WHO partnerships such as these represent a conflict of interest. On the contrary, we believe such collaboration, which provides drugs for periods long enough to reach the target, are an exemplary commitment to public health in the 21st century.

There are several other contributors. The Arab Fund for Economic and Social Development was among the first. The Governments of Belgium, Italy, Japan, the Netherlands, Spain, and the United Kingdomare now generous supporters of the global programme. We are working to widen these partnerships further.

For the commitment of these partners, and to all the equally important organizations that have committed their technical skills to this cause, I would like to express my sincere gratitude. The Global Alliance has the will to eliminate lymphatic filariasis and we all know the way. Let us focus on the highest priority actions for elimination and we will surely make an impact on the lives of the poorest.

Dr Gro Harlem Brundtland
Director-General
World Health Organization

Executive Summary

Green Light for the Global Alliance to Eliminate Filariasis, Attack Poverty

By all accounts, the first meeting of the Global Alliance to Eliminate Lymphatic Filariasis convened in Santiago de Compostela, Spain on 4-5 May 2000, was a success. It more than fulfilled its stated goals to review progress in the 18 months since the previous Partners' Meeting in October 1998, to strengthen the existing Alliance, to seek creative ways to stimulate financial and other support in order to "reach the first 200 million people at risk by the end of 2004."

Overall, more than 25 presentations were made to some 70 participants at the meeting (see list of participants in Annex). Following the welcoming ceremony and completion of organizational matters, a global overview of the disease and its links to poverty was presented, followed by reports and recommendations from the first meeting of the Technical Advisory Group on the Global Elimination of Lymphatic Filariasis (2-3 May 2000) and the Programme Review Group.

In phase two of the meeting, regional and country presentations were made by 11 delegates, reviewing progress and contributions made to LF elimination among people in affected areas through mapping, strategic research and the development of new cost-effective interventions. The importance of interruption of transmission and alleviation of suffering were repeatedly stressed, as was the need for mapping and programme integration. It was recognized that no one agency could achieve success alone but that partnerships were imperative, as were the development of advocacy and resource mobilization campaigns. This session concluded with a "Targeting LF" video produced by SmithKline Beecham.

Phase three featured interactive dialogue as participants divided into six working groups to discuss strategic issues on themes ranging from 1) communication and information to 2) creative support and funding to 3) the role of NGDOs to 4) effective country action to 5) critical elements for successful LF programmes to 6) maximizing regional coordination. The final day was devoted to presentation and discussion of the informal recommendations of each of the discussion groups.

The meeting concluded with closing statements by the major partners: SmithKline Beecham, Merck & Co., Inc., the World Bank, the NGDO spokesperson, WHO, the meeting Rapporteur, and the chairperson. The upshot was that "an enormous amount of activity" had occurred in the short space of the last two years to position the new Global Alliance favourably for success in reaching its goal of eliminating lymphatic filariasis as a public health problem by the year 2020. Participants were agreed that this meeting, too, had been a success and that the strengthening of partnerships between the public, private and non-profit sectors was crucial to this endeavour. There were two press conferences and favourable media coverage, especially in Spain.

At the conclusion of the meeting, the chairperson representing India announced that his country, with the active support of WHO and SmithKline Beecham, would launch a major LF elimination campaign, starting with a 40 million-person pilot programme. As one WHO participant put it, "This is a major breakthrough; it will change the entire nature of our work." Or, as the Rapporteur said in his closing remarks, "The most important thing to communicate is that this campaign to eliminate lymphatic filariasis is a "first" – and that it is going to succeed. In Santiago, the Global Alliance moved from being an idea with a name – to a concrete reality."

Mounting a massive effort against a disease of poverty

Opening ceremony

The beginning of this two-day conference featured statements by WHO and its Spanish Government counterparts, highlights of which are found below.

WHO Welcome Address

Dr Maria P. Neira, WHO Director of the Department of Control, Prevention and Eradication in the cluster for Communicable Diseases, opened the meeting by thanking the City of Santiago de Compostela, the Province of Galicia, and the Government of Spain for linking itself so prominently with WHO's worldwide effort to eliminate lymphatic filariasis as a public health problem.

Infectious diseases killed 14 million people each year, she said, and exacerbated this personal trauma by undermining national social and economic development.

The graphic (below) presented by Dr Neira illustrated the four main categories of communicable disease in the world: the big killers like HIV/AIDS, TB and malaria; the recurrent threats (e.g. yellow fever, cholera, meningitis), the emerging and re-emerging marauders (e.g. Ebola, hepatitis C); the **diseases targeted for elimination** as public health problems: polio, onchocerciasis (river blindness), leprosy, guinea worm disease, Chagas' disease, schistosomiasis — and **lymphatic filariasis. It can be done by 2020.**

Infectious diseases: fatal, recurrent, (re-)emerging and eradicable

Obstacles to Social and Economic Development

Fatal disease	To be eradicated or eliminated	Emerging diseases	Recurring diseases
AIDS	Polio	Rift Valley Fever	West Nile Fever
Tuberculosis	Leprosy	Creuxfeld Jacob's Disease (CJD)	Monkeypox
Malaria	Guinea worm	Ebola	Plague
Measles	**Filariasis**	Nipah	Cholera
Diarrhoeal disease	Onchoceciasis	Lassa Fever	Meningitis
Pneumonia	Measles		Cholera
	Chagas' disease		Yellow Fever

Lymphatic filariasis, though not usually deadly, is a prime disabler – both of people and of progress. Yet it is a disease that is "effortlessly curable" with the right resources and political will.

Counter-intuitive though it might seem in this age of unprecedented progress and high technology, communicable diseases still accounted for 45% of all deaths in least developed countries and 48% of all premature deaths worldwide, she said, including all of the social and economic losses that went with them. In this day and age, this is *unacceptable*. Together we must do something about it, Dr Neira stressed.

Dr Neira described lymphatic filariasis (LF) as an infectious disease transmitted by mosquitos. It affected 120 million people in more than 80 countries, she said, thriving in impoverished urban and rural communities in tropical developing countries. The parasites (larvae and worms) lodged in human lymphatic systems and, over the years, caused permanent disability through swelling in reproductive organs and lower physical extremities. Equally devastating were the psychological stigma and adverse social consequences caused by this debilitating and disfiguring disease.

"Clearly, we must mount a massive effort against such diseases of poverty. Lymphatic filariasis is one of them. We can eliminate it," Dr Neira asserted. "To do so, the paradigm must be broadened from vaccines to drugs and other products. Collaboration must also be broadened to a wider range of committed partners."

> "We must mount a massive effort against the diseases of poverty. "Lymphatic filariasis is one of them - and we can eliminate it."

Today's green light for the Global Alliance was very important, she said. "We have the means, the mechanics and the will. We must follow with action. Former American First Lady, Eleanor Roosevelt once said, 'The future belongs to those who believe in the beauty of their dreams.' The 'dream' of this Global Alliance is to eliminate lymphatic filariasis once and for all from the earth. With 'a little help from our friends', we will do it, too, in the short space of only twenty years."

Address by His Excellency D. Fernando Riquelme Lidon, Spanish Secretary of State and Ambassador on Special Mission, Ministry of External Affairs

Ambassador Riquelme Lidon singled out the importance of eradicating poverty which he called an "aggression against human dignity" and both a cause and consequence of ill health. He cited Spain's ongoing collaboration in the Americas and said that the current focus on lymphatic filariasis would reduce its "intolerable damage".

Video Welcome: WHO Director-General Dr Gro Harlem Brundtland

An extract from the message from the Director-General is given on page vi.

Address by Mr Enrique Castellon Leal, Spanish Vice-Minister of Health

Mr Castellon Leal cited LF's heavy global disease burden – 120 million people in 80 countries, 700 000 of them in South America alone. He also referred to the goal set to eliminate LF as a public health problem by 2020 through stopping transmission and reducing morbidity.

Address by Mr Manuel Fraga Iribarne, the President of the Galician Government

In declaring the meeting opened, Mr Fraga Iribarne highlighted health improvement as a primary objective of social and economic development in the 21st century. Referring to Santiago's history as a place of pilgrimage since the 12th century with a long tradition of concerns about illness and water-borne diseases affecting many pilgrims, he said that the scientific community must remain on the alert for re-emerging diseases. He also focused on the "moral link", bolstered by a decade of close cooperation, between the Spanish Government and PAHO. "Only one illness – smallpox – has ever been eradicated in the whole history of health," he said. "Now lymphatic filariasis is one of seven slated for elimination within the coming decades." He expressed the hope that this Santiago-hosted meeting would prove useful in developing the Global Alliance to fight LF.

Comments

Dr Neira commented on the importance of financial support by the Spanish Government and the high-level political commitment to action against LF in the Americas.

Appointments

Mr Javid A. Chowdhury, Secretary, Indian Ministry of Health and Family Welfare, was elected Chairperson of the meeting by consensus, and Dr Bernhard Liese, Senior Adviser, Human Development, African Region, the World Bank, was appointed as meeting Rapporteur.

much importance to building new partnerships, such as the current one with the Lymphatic Filariasis initiative.

Mr Mason said that DFID had reaffirmed its long-term support for this initiative in January with the Liverpool School of Tropical Medicine LF Support Centre formally coming into existence in April 2000.

The task is enormous, he said; in many ways, a microcosm of the challenge DFID set itself in redefining its approach to international development. "We are learning more all the time from attempting to change the way we support development. I know the LF initiative is well-equipped to do the same."

Mr Mason concluded by saying that "We in the UK are proud to be associated with the initiative. It is concrete action to match the aspiration of eliminating poverty. It builds on partnership and a sharing of effort. It will rely on trust and transparency. We hope to continue to play whatever role the initiative asks of us to contribute to the success of this great endeavour."

Criteria: The New Vision for Development

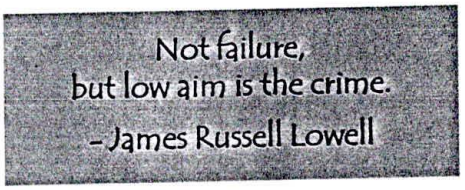
This LF initiative "brings together all the elements that the new vision of development demands:

- a true partnership, of different players all with strengths harmonized to a common purpose;
- strategic soundness, but embracing flexibility and pragmatism;
- commitments to lesson-learning and ownership by national governments, and
- strengthening of health systems generally rather than a narrow disease-specific intervention".

Address by the representative of the Government of the United Kingdom's Department for International Development: Eliminating World Poverty: A Strategy for the 21st Century

The presentation delivered by Mr Phil Mason, Deputy Head, Health and Population Division, of the United Kingdom's Department for International Development (DFID), focused on the links between poverty and ill health and strategies to eliminate them in the new millennium.

A White Paper published by the British Government in November 1997[1] re-defined Britain's international development approach with the overarching goal of contributing to *halving the number of people living in poverty by 2015.* No one underestimated the challenge, Mr Mason said, quoting American poet James Russell Lowell who wrote that "Not failure, but low aim is the crime".



Britain allied itself firmly to the bold aspirations of International Development Targets – a world free of abject poverty; a world in which *all* children are educated; where health care removes the shadow of illness and disability; an environmentally sustainable world in which each generation hands on to the next what is needed for living fulfilling and productive lives.

These International Development Targets – "the bedrock of the UK's international development strategy"– represent key aspirations in human development: reducing child and maternal mortality; making reproductive health care accessible for all; providing universal primary education; eliminating gender imbalances in education – all by 2015; and implementing national strategies for sustainable development in all countries within the next five years.

Mr Mason said he liked to think of these targets as "aiming for the stars...they may always be out of reach, but like the maritime explorers of old, we can chart our course by them". He also pointed to six reasons why these human development targets were different – and feasible:

- **Consensus:** They are shared targets, endorsed by the big UN conferences of the 1990s, giving them the legitimacy of being owned by all, not imposed by the few. "For the first time in living memory, perhaps ever, there has materialized a global consensus about the important things we need to do."
- **United Nations Reform:** The UN, emerging from a period of Cold War sterility, is reforming and re-engineering itself as a far greater contributor to international development than it was in the past. The Development Assistance Framework at country level means UN agencies work much more closely together. Reforms at headquarters level with results-based budgeting in UNICEF, UNFPA and UNDP are making progress. The trend is in the right direction.
- **WHO Revitalization:** Considering how many of the Targets are health-related, the reforms introduced by WHO Director-General, Dr Gro Harlem Brundtland, are widely regarded as re-energizing, empowering WHO to recapture the lead in international health.
- **Performance Measurement:** To match its aspirations, the international community has agreed on 21 indicators to monitor global progress which will complement develop-ment targets set by national governments.
- **Globalization:** Increasing awareness of the disparities between rich and poor assail our consciences daily. Rapid communication links mean that business happens very differently. Suddenly there is a shared interest in the health of people thousands of miles away. HIV/AIDS and tuberculosis serve as a stark reminder that the threat of transmission is now global.
- **New Opportunities:** Finally, Mr Mason said, there had never been a more fertile moment for directing new energy at the problem. Despite fluctuating official government development assistance levels, big philanthropic foundations now offered vast new opportunities. "I was told recently that the top six US Foundations now out-spend the US Agency for International Development. This is a window of opportunity that behoves us all to respond," he concluded.

"That is our vision...but we need more than lofty ideas. Enthusiasm is no substitute for capacity; willingness no substitute for experience," Mr Mason said, explaining why DFID attached so

[1] *Eliminating Poverty: A Challenge for the 21st Century*, DFID, United Kingdom, November 1997.

The Programme to Eliminate Lymphatic Filariasis

Lymphatic Filariasis: A Global Overview[2]

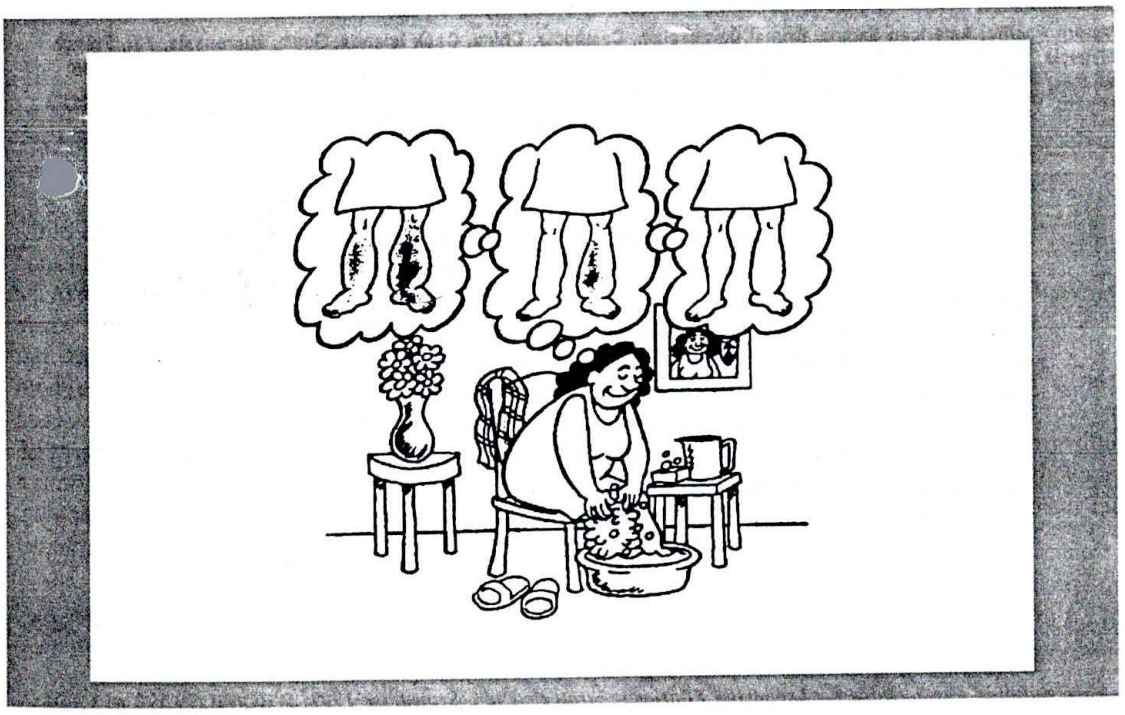
Dr Eric Ottesen, Project Leader, Lymphatic Filariasis Elimination (WHO), Department of Control, Prevention and Eradication, Communicable Diseases, WHO

Dr Ottesen started his presentation with the observation that, even though "the excitement is really what happens on the ground – at the country and community level," it was vital to the worldwide elimination of lymphatic filariasis to have the right programme-supporting "building blocks" in place. Therefore, his "global overview" would emphasize the contributions of many to this effort of laying "the appropriate building blocks for the programme".

Briefly recapitulating where and how it all began, Dr Ottesen said that the Partners' Forum in October 1998 in Geneva had affirmed the overarching goals of the programme as:

- **Interrupting transmission**, primarily through mass treatment of all endemic populations with a single-dose, once-yearly, two-drug regimen – albendazole with either Mectizan® (ivermectin) or diethylcarbamazine (DEC) – for four to six years or the secondary option of DEC-fortified table/cooking salt for one year; and
- **Controlling morbidity** (i.e., alleviating suffering, preventing disability, promoting rehabilitation) through intensive local hygiene and education for patients and healthcare workers.

New hope for people with Lymphoedema



[2] For further details, see *WHO's Global Programme to Eliminate Lymphatic Filariasis: Programme Activities 1999.*

Recommendation: Upgrade this process to a formal study; produce LF morbidity monitoring indicators and use results as interpretation models.

- **Ensuring supplies of quality DEC Drugs:** Steps for manufacturing to ensure quality products (e.g. new chromatography assay).

  Recommendations: 1) Order DEC through WHO to achieve economies of scale; 2) launch studies on the development of chewable tablets to preclude difficulties with inadequate or contaminated water supplies; 3) appoint a small group to study the use of standardized tablet strengths/colours.

- **Morbidity control**: Development and dissemination of the strategy.

  Recommendations: 1) Define disability prevention and rehabilitation terminology in terms of its components (e.g. management of lymphoedema/elephantiasis, cure of hydrocele); 2) strengthen morbidity control through targeted resource mobilization efforts, such as NGDO inventory and training, documentation of needs, etc.; 3) monitor follow-up activities through development of regional LF collaborating centers, support for hydrocelectomy and IEC to advocate for morbidity control.

- **LF as a childhood disease:** Unrecognized and under-reported in the past, studies now reveal that LF disease starts in childhood and that proper treatment can prevent it.

  Recommendations: 1) Mobilize partners, such as UNICEF, interested in disease/disability prevention in children; ensure treatment and support for children undergoing ADL attacks; 2) develop advocacy packages; 3) conduct studies on effective macrofilaricidal treatment with DEC and albendazole; investigate effectiveness of various regimens on treating and preventing the disease in children.

Summing up the reflections of the Technical Advisory Group, Dr Dadzie highlighted the importance of this programme to combat "the world's second largest cause of permanently disabling disease". He reminded his audience that LF was assessed to be eradicable and that the intervention tools were available. The Technical Advisory Group members were satisfied, he reported, that the programme was off to a good start, had strong operational research components and a sound plan for "learning through doing".

Dr Dadzie expressed the view that the next 20 years for LF would resemble the last 20 years for the onchocerciasis programme and that it would be a similar success story. He stressed the need to mobilize partners to fight this disabling disease.

Report from the Programme Review Group[8]

Dr Barnett Cline (USA), Professor Emeritus, Tulane University School of Public Health and Tropical Medicine, New Orleans, USA, began the presentation by identifying the members of the Programme Review Group: Dr P.K. Das (India), Dr Jaime Z. Galvez Tan (Philippines), Dr Peter Kilima (United Republic of Tanzania), Prof Isao Tada (Japan), Dr J. Williams (New Zealand) and himself. The Programme Review group was an independent body with members were appointed for a three-year term.

Dr Cline said that there had been four meetings to date, initially focused on developing criteria for the review and application process. The review criteria were as follows:

- Ministerial commitment to the elimination of lymphatic filariasis;
- Sufficient epidemiological and parasitological data to begin operations, and provision to expand that data progressively as needed to support the requirements of a full national

[8] On 5-6 May 2000 immediately following the First Meeting of the Global Alliance, an *ad hoc* meeting of the Programme Review Group was held at which: 1) The Dominican Republic's plan of action was reviewed and release of 200 000 albendazole tablets for the first year approved; 2) The national LF plan of the Federal Islamic Republic of Comoros was reviewed and their request for albendazole approved; 3) The plan resubmitted by Kiribati was reviewed and conditionally approved for release of albendazole subject to completion of administrative formalities; 4) The meeting received a new application from the Government of Bangladesh to initiate mass drug administration as of January 2001; this would be reviewed in the next meeting in September 2000; 5) There was discussion of issues around harmonization of the application form for requests for both albendazole and Mectizan® (ivermectin) by countries in Africa where onchocerciasis co-exists with LF, with the objective of keeping the entire application process as simple as possible for endemic countries; 6) A preliminary plan for Guyana was also discussed.

programme (a phased approach) generally anticipated for larger countries);

- Potential to integrate with other public health services/programmes;
- Existence of a national coordination committee or similar body;
- Clear identification of resource requirements needed to implement the intervention programme;

for applications requiring expansion of initial operations, the provision of evidence that:

  - the targets of the initial operations are being met,
  - the epidemiological data are available to justify the expansion,
  - the resources for that expansion are adequate;

- Technical capacity present already or a clear statement of how such capacity will be created;
- Guaranteed exemption from fees or counter-part payments to cover customs duties, acceptance and clearance; evidence of mechanisms in place for appropriate drug handling and warehousing;
- A plan for impact assessment on transmission in a subset or sentinel group of the treated population;
- The capacity to adequately identify, manage, report and monitor serious adverse experiences with the drugs being used.

The Programme Review Group could play "a key role in the process of decentralization," Dr Cline said, emphasizing that problem-solving should occur at the country and regional level.

Dr Jaime Z. Galvez Tan (Philippines), Professor, Department of Family and Community Medicine, University of the Philippines, then presented a status report, saying that a total of 44 out of 80 LF endemic countries were in various stages of readiness for LF elimination. Eight countries had already begun multi-drug administration: one in The African Region (Nigeria); one in the Eastern Mediterranean Region (Egypt); and five in the Western Pacific region (American Samoa, French Polynesia, Niue, Philippines, and Western Samoa).

> Our future is to devolve into the regions – where the real problem-solving takes place.

Six additional countries' applications had been approved: three from the African region (Ghana, Tanzania and Togo), one from the Americas (Dominican Republic) and two from the Western Pacific (Cook Islands and Vanuatu). Another six had almost completed the application process: two from the African Region (Zanzibar and the Comoros), one from the Americas (Haiti) and two from the Western Pacific (Fiji and Kiribati). Applications were being prepared by seven other countries: Bangladesh, India, Indonesia, Maldives, Myanmar, Sri Lanka and Thailand.

Three additional countries had almost completed their plans of action: Brazil, China and Viet Nam. Fourteen other countries had already expressed interest in the programme: Benin, Burkina Faso, Côte d'Ivoire, Guyana, Nepal, Malaysia, Papua New Guinea, Solomon Islands, Sudan, Tuvalu, Uganda, Wallis and Futuna, Yemen and Zambia.

In response to a comment about the future of the Programme Review Group, Dr Cline said, "Our future is to 'devolve' into the regions – where the real problem-solving takes place."

Regional and Country Reports

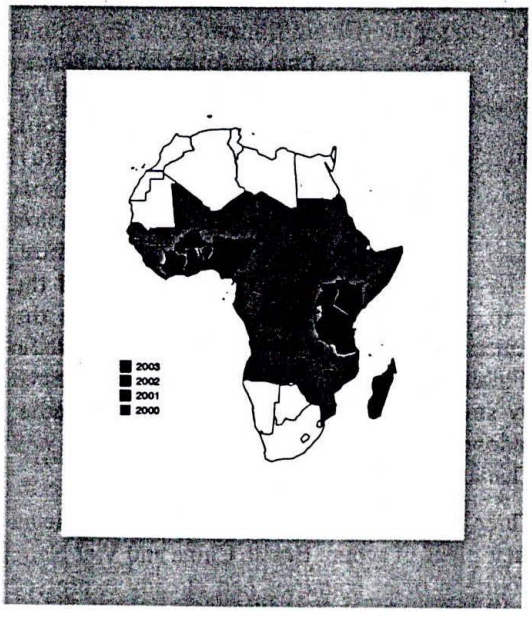
African Region

Dr J. B. Roungou presented the first regional status report, saying that 39 of the 46 countries in the African Region[9] were LF endemic (see map, page 12) and 420 million people were considered at risk for LF. Monitoring and mapping was a top priority for the region; a workshop had already been held (Ouagadougou from 8-12 March) for 23 nationals from 7 countries; over 106 000 ICT tests have been ordered by WHO.

Priority activities, according to Dr Roungou, centred around mapping the distribution of the disease, which he estimated would require about US$ 305 000 to cover mapping field expenses. Mass treatment using the two-drug regimen would also be needed to interrupt transmission. In addition, both regional and national plans were needed as only Ghana, Togo and Tanzania already had national LF plans approved.

[9] Of the 51 countries on/adjacent to the African continent, 46 belong to WHO's African Region while three (i.e., Egypt, Sudan and Yemen) belong to the Eastern Mediterranean Region.

Phases of the mapping of LF distribution



Looking forward, Dr Roungou said it would be crucial to strengthen WHO's Regional Office for Africa and get partners involved. DFID had been the main contributor to date. A major constraint had been "delayed funding".

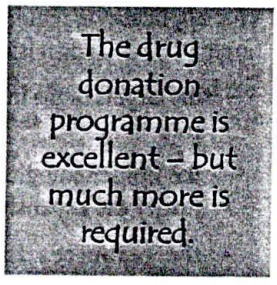
Ghana

Dr John Gyapong, Acting Director, Health Research Unit, Ministry of Health, Ghana, began by saying that Nigeria should actually be presenting since it had already launched its programme and Ghana was still gearing up. He presented facts and figures on:

- **The extent of the problem:** LF was concentrated in the north and in the southern coastal belt; there was no adequate explanation of why the central regions of Ghana appeared to have a much lower endemnicity.
- **Control measures to date:** Mapping of endemic regions.
- **Future plans:** The goal set was to attain 80% treatment coverage and reduce ADL incidence by 50%.
- **Constraints and challenges:** Lack of a sense of urgency, vertical vs. horizontal, control vs. elimination. "We worry about how to go the extra mile towards elimination. Then resource mobilization becomes crucial," Dr Gyapong said. "The drug donation programme is excellent – but much more is required. We need resources at the right place at the right time (that is, not during the rainy season)."

The region's partners included:

- The Carter Center which was supporting activities in Nigeria;
- DFID which, through the Liverpool School of Tropical Medicine LF Support Centre, had funded the Ouagadougou workshop and activities in Benin, Burkina Faso and Côte d'Ivoire;
- HDI which was funding activities in Ghana and Togo;
- Merck & Co, Inc.;
- SmithKline Beecham;
- WHO; and
- The World Bank.



In the open discussion period following the presentation, the Director of the Mectizan® Donation Program, Dr Stefanie Meredith, said that a "sustainable long-term cash flow" would be needed to truly eliminate filariasis. Dr Anne Haddix, economist from Emory's Support Center at the Rollins School of Public Health, introduced a funding study[10]. Comments were also made on the vertical vs. horizontal issue, pointing out the difficulty of achieving 80% coverage as a horizontal programme when in competition with other priorities; also that vertical programmes were not very cost-effective. It was also pointed out that in Nigeria the onchocerciasis and LF programmes overlap – for example, 12 million people had already been treated for "river blindness" – and that the APOC/OCP institutional memory could also be used for LF. Finally, the Rapporteur Dr Bernhard Liese (World Bank) said that the onchocerciasis programme, which had already been in operation for 13 years, should be able to show what Mectizan® (ivermectin) had done for LF as well during that time but the response was that no LF data had been collected.

Region of the Americas

Dr John Ehrenberg, Regional Advisor in Communicable Diseases at WHO for the Americas presented an overview of LF in the Americas, noting the endemic countries as Brazil, Costa Rica, the Dominican Republic, Haiti, Guyana, Suriname, and

[10] The Cost of the Global Programme to Eliminate Lymphatic Filariasis: Years 2000 – 2004. The LF Support Center of Emory University, USA, Spring 2000.

Trinidad and Tobago. All told, WHO estimated that there were about 420 000 infected persons with the greatest numbers in Haiti (200 000) and the Dominican Republic (100 000). Of Brazil's total population of 165,5 million, 3 million (1.8%) were considered at risk. Although the numbers were far smaller, in terms of percentage of at risk population, Suriname topped the list with 90%, followed by Guyana with 8 %.

"The good news", he said, was that:

- Lymphatic filariasis was focalized in the Americas;
- The number of cases is relatively small compared to other WHO regions;
- Tools to eliminate LF as a public health problem n the region were all available; and
- Several groups in the Americas had made significant contributions to further LF knowledge.

Challenges which needed to be met included the following:

- **Update information** on the current status of lymphatic filariasis in the Americas;
- **Raise the profile**: until recently, LF had not been perceived as a high priority by most of the health authorities throughout the region;
- **Increase IEC**: MoH authorities had had little to no access to updated information (e.g. scientific publications, reports, theses, etc.) on lymphatic filariasis or the feasibility of its elimination; and
- **Build capacity**: national programmes were technically weak, understaffed under-funded and/or absent in most of the seven endemic countries.

Dr Ehrenberg listed the regional priorities (Phase 1 of the regional plan of action) as follows:

- National focal points would need to be designated;
- Plans of actions would have to be written or modified;
- Financial resources would need to be mobilized;
- National task forces would have to be formed; and
- Albendazole applications would need to be completed and submitted.

Major constraints, in Dr Ehrenberg's view, included:

- Delays in strengthening the regional office;
- Insufficient and delayed funding; and
- Unclearly defined mechanisms for funding field activities.

Dominican Republic

Dr Guillermo Gonzalvez, National Center for Tropical Disease Control, Santo Domingo, presented the Dominican Republic Filariasis Elimination Program. Beginning with country statistics, he said that the Dominican Republic occupied two-thirds of the island of Hispañola (located west of Puerto Rico in the Caribbean) which it shared with Haiti.

Demographically a young country, 35% of the population of 8.3 million was under 15 years of age and life expectancy had grown from 44 to 71 years in the short space of 18 years (1980-1998). About 65% of the population were urban dwellers, many of them immigrants. It was estimated that over 30% of the population could be at risk of the infection although the real prevalence of the disease is still unknown.

... over 30% of the population (of the Dominican Republic) could be at risk of the infection.

To address this situation, a pilot project focusing on elementary school students was introduced in March 1998: in the capital city of Santo Domingo, 13% of samples were LF-positive; in the smaller city and Barahona, it was only 4%. By extrapolation, it is estimated that the number of LF cases for the entire country may number around 100 000.

In February 1999 national mapping activities started to ascertain which regions and municipalities were affected. By April 2000 prevalence studies had been concluded in 51 municipalites (out of 154). Eleven of these municipalities (21%) were found to be positive with at least 1% prevalence with *W. bancrofti* antigen.

Dr Gonzalvez concluded by saying that the LF elimination programme was integrated with the programme for the control of intestinal parasites, malaria and dengue.

Eastern Mediterranean Region

Dr Nikolai Neouimine, CEE Regional Adviser, WHO Eastern Mediterranean, said that the status of lymphatic filariasis in the WHO Eastern Mediterranean Region was "not exactly defined" in some parts of the region due to scarce information and the absence of systematic collection and reporting.

Countries in the region with ongoing transmission included Egypt, Sudan and Yemen, which would be priority countries for mass drug administration, while those with a past history of transmission included Djibouti, Iran, Oman, Pakistan, Saudi Arabia and Somalia. Dr Neouimine said that countries needed to devote more efforts to verifying the status of LF; to this end, activities had already been initiated in Egypt, the Syrian Arab Republic and Yemen.

Regarding progress to date, Dr Neouimine said that

- A regional plan for LF elimination had been prepared;
- A regional workshop had been organized on LF elimination for national programme managers;
- LF elimination would be an agenda item at the Regional Committee for the Eastern Mediterranean in October 2000;
- A national plan for LF elimination had been prepared in Egypt;
- An assessment plan of LF status in Yemen had been prepared and ICT cards supplied;
- Verification of LF-free status had been initiated in Syria;
- A pilot project on mass drug administration had been completed in Egypt;
- Albendazole had been provided for mass drug administration in Egypt; and
- WHO documents on LF elimination had been distributed.

Dr Neouimine stressed that LF elimination should be integrated with other programmes; for example:

- In Egypt, with primary health care and schistosomiasis control;
- In Sudan, with onchocerciasis control; and
- In Yemen, with primary health care, leprosy control and schistosomiasis control.

The region's main partners in LF elimination were the Arab Fund for Economic and Social Development, SmithKline Beecham and Merck & Co. Inc. The main constraints were identified as:

- Lack of financial resources for LF elimination;
- Weak social mobilization and community participation;
- Insufficient surveillance systems;
- A need for ICT cards.

Egypt

Dr Khaled Gado, Director of Filariasis Control in the Egyptian Ministry of Health, outlined the situation in his country. It was pointed out that bancroftian filariasis has been endemic in Egypt, mainly in the eastern Nile Delta and manifesting itself as clinical elephantiasis, since the times of the pharaohs. Today 10 of the country's 26 governorates were LF-endemic, the population at risk was approximately 2 million and the estimated number of infected people 150 000.

Launching of the Egyptian programme will take place in the third quarter of 2000.

Efforts at LF control started as long ago as 1910, based first on water management and later on detection through night-blood sampling and treatment with DEC. Egypt was among the first endemic countries in the world to embrace the concept of lymphatic filariasis elimination; it had developed a plan of action in 1996 and begun its implementation with WHO assistance.

As a result, Egypt would be one of the first countries in the world to initiate a national programme to eliminate LF within the framework of the WHO global programme. It had already completed a pilot project of mass drug administration (albendazole and DEC) in two villages.

Launching of the overall programme would take place in the third quarter of 2000. The plan of action foresaw interruption of transmission through annual mass chemotherapy plus palliative treatment of clinical cases; health education and staff training. Two post-treatment assessments would be performed to evaluate the efficacy of the programme.

South-East Asia Region

Dr Chusak Prasittisuk, Regional Advisor, Vector-Borne Disease Control, South-East Asia Region, reported on the current situation in the ten South-East Asia countries with a collective population of 1.46 billion or 25% of the global total. He referred to the region's strategic plan which noted that an estimated 600 million of them – 60% of the global LF burden – were living in endemic areas. About 60 million persons – or half the global figure of 120 million – either harboured microfilaraemia or suffered from clinical manifestations. All the three lymphatic filaria parasites were prevalent in the region[11], bancroftian filariasis constituting "the most predominant infection in continental Asia".

The eight known endemic countries in the Region were: India (which alone accounted for 44% of all infections), Bangladesh, Indonesia, Maldives, Myanmar, Nepal, Sri Lanka and Thailand. Formal filariasis control programmes already exist in five of the eight countries: India, Indonesia, Myanmar, Sri Lanka and Thailand.

Despite this challenging situation, there were a number of favourable factors for LF elimination:

- **Biological:** Humans are almost the only reservoir host for lymphatic filariasis in the region; prolonged exposure with multiple infective mosquito bites was required to establish infection in a new human host; the parasite did not multiply in intermediate mosquito hosts; the infective larvae were not inoculated into the human host directly but deposited on the skin where the majority of them did not survive; and the incubation interval was prolonged to many months and would take many years to establish active transmission in a new area.
- **Available tools:** Low cost, safe and very effective drugs were available for prevention of infection and treatment of clinical cases; diagnostic kits and monitoring tools were available within the reach of endemic countries to detect infection in man and mosquito; and cost-effective control technology had been developed for LF elimination in many endemic countries.
- **Feasible operations:** Many countries had acquired valuable experience in the time-bound successful elimination of lymphatic filariasis; community cooperation was very encouraging when the LF elimination programme was integrated with the control of intestinal helminthic infections; infrastructure for implementation of the programme was available in all endemic countries in the South-East Asia Region.
- **Partners:** As elsewhere, SmithKline Beecham supported the programme in South-East Asia with a free and adequate supply of albendazole; and other UN system agencies (e.g. the World Bank) and bilateral agencies were actively involved.

The region's targets by the end of the year 2000 included *inter alia* the following:

- Holding informal consultations with programme managers of all the Region's endemic countries;
- Finalizing the Region's strategic plan;
- Developing advocacy materials/activities for the elimination of LF from the region; and
- Establishing national task forces in all endemic countries.

Comments: The meeting's chairperson, Mr Javid Chowdhury (India) remarked that, "although the LF elimination goal of 2020 is fine, we must see some dramatic results within the next *five* years if we are to maintain momentum."

India

Dr Ashok Kumar, Director of India's National Anti-Malaria Programme, gave a presentation entitled *Lymphatic Filariasis In India: Steps Towards Elimination,* which began with a clinical and parasitological description of the disease. Turning to the magnitude of the problem and its control strategy in India, Dr Kumar said that LF was one of the major public health problems in his country where 18 states and union territories were LF-endemic. India's National Filaria Control Programme (NFCP) had been launched in 1955 and evaluated in 1960, 1971, 1982 and 1995. Present estimates indicated that about *454 million people* were at risk, 113 million of them in urban areas where most NFCP activities were focused, although more recent attempts had been made to expand the programme to rural areas as well.

Present estimates indicate that about 454 million people in India are at risk.

[11] *Wuchereria bancrofti, Brugia malayi* and *B. timori*

Dr Kumar said that the main control strategy included:

- Recurrent anti-larval measures at weekly intervals with larvicides;
- Environmental methods to control mosquito breeding (e.g. filling ditches, pits, low-lying areas, de-weeding, de-silting and trimming of drains, water disposal and sanitation);
- Community observance of weekly 'dry days' (e.g. emptying of water containers once a week);
- Biological control of mosquito breeding through larvivorous fish;
- Anti-parasitic measures and DEC treatment;
- IEC for community awareness and involvement.

As a result, LF in urban areas was decreasing, he said. Funds for these activities (combined with the urban anti-malarial scheme) for 2000-2001 amounted to Rs.10.25 crores (Rs. 102.5 million), equivalent to US$ 2.4 million.

Following the 1997 WHO resolution that "elimination of filariasis as a public health problem should be considered a priority by Member States", a project was initiated in 13 districts of 7 Indian states[12] covering about 40 million population. Mass administration of DEC was being observed as a 'Filaria Day' in these districts.

A mid-term assessment of this pilot project in January 2000 recommended that:

- The pilot project should run for five years as the impact could be seen only after at least three years of DEC consumption; it should be supervised and tablet strength increased to reduce total number of tablets for consumption; DEC syrup for children under four years of age should be provided;
- Proper monitoring, supervision and timely review at all levels should be conducted;
- Funding and development of site-specific IEC materials and sensitization of people for community awareness through campaigns, meetings, discussion and personal contacts should be undertaken;
- Pre- and post-assessment surveys should be carried out; and
- Orientation of medical and para-medical officials for the management of side reactions should be provided.

Based on a multi-centric DEC delivery study carried out with WHO/TDR support in 1998-1999, it was recommended that there be greater political commitment and stronger health sector involvement with comprehensive training of health workers and communities involved in drug delivery.

As for next steps, Dr Kumar said that India, as a partner of the Global Alliance, was committed to eliminating lymphatic filariasis by 2020 in accordance with WHO's 1997 resolution. The Indian initiative to eliminate LF was envisaged in two stages:

- **Phase One:** The pilot project in 13 districts with 40 million population would be expanded from the single dose, mass annual administration of DEC to add albendazole to the regimen: 40 million albendazole tablets would be required annually.
- **Phase Two:** 261 endemic districts would be brought under the mass administration of DEC and albendazole so that India could keep pace with the other endemic countries in achieving LF elimination by 2020. This would require ICT card mapping and active involvement at all levels of society.

Concerning financial implications, keeping in mind that albendazole would be supplied free of charge by SB through WHO, funding projections for Phase Two indicated that total costs for IEC and treatment of about 440 million adults, training for approximately 10 000 primary health care (PHC) medical officers, 120 000 paramedics and 30 000 health workers, annual independent assessments and mapping of endemic areas would amount to US$ 24 million.

Western Pacific Region

Dr Kazuyo Ichimori, WHO scientist in the Country Liaison Office in Vanuatu, made a presentation on behalf of the Western Pacific Region where the LF distribution pattern showed the Philippines (33% of the people at risk in the region) to be first, followed by China and Malaysia (22%), Cambodia (20)%, Viet Nam (20%) and the Pacific Island countries (5%).

PacELF, she explained, was a regional collaborative approach to eliminating LF in 22 Pacific Island countries with a total population of 7 million (350 000 affected by the disease) by 2010, ten years ahead of the global elimination target date. Such a coordinated approach was needed in the Pacific because these island countries were small and had

[12] Bihar, Uttar Pradesh, West Bengal, Orissa, Andhra Pradesh, Tamil Nadu and Kerala.

limited resources and there was a great deal of inter-island travel. Therefore, working together, sharing resources and helping one another to implement a comprehensive regional strategy would be necessary.

The progressive targets for PacELF were to certify LF-free status for individual countries by 2005, followed by declaration of region-wide elimination by 2010. The strategy involved mass treatment with annual single dose combination drugs (albendazole and DEC), repeated three to five times.

Group 1 (low or non-endemic countries) included Guam, Kiribati, the Marianas, Marshall Islands, Nauru, Palau, Pitcairn and Tokelau.

Group 2 (endemic island countries with populations under 500 000) included American Samoa, Cook Islands, French Polynesia, Micronesia, New Caledonia, Niue, Samoa, Solomon Islands, Tonga, Tuvalu, Vanuatu, and Wallis and Futuna.

Group 3 (LF-endemic large countries with population of over half a million) included Fiji and Papua New Guinea.

There would be an integrated programme combining blood survey and follow-up, mass drug administration, mosquito control, morbidity control and an IEC awareness-raising campaign. American Samoa, with its high LF incidence but also 96% drug coverage rate, would serve as a model. PacELF's main partners were WHO and the Secretariat of the Pacific Community (SPC).

The Philippines

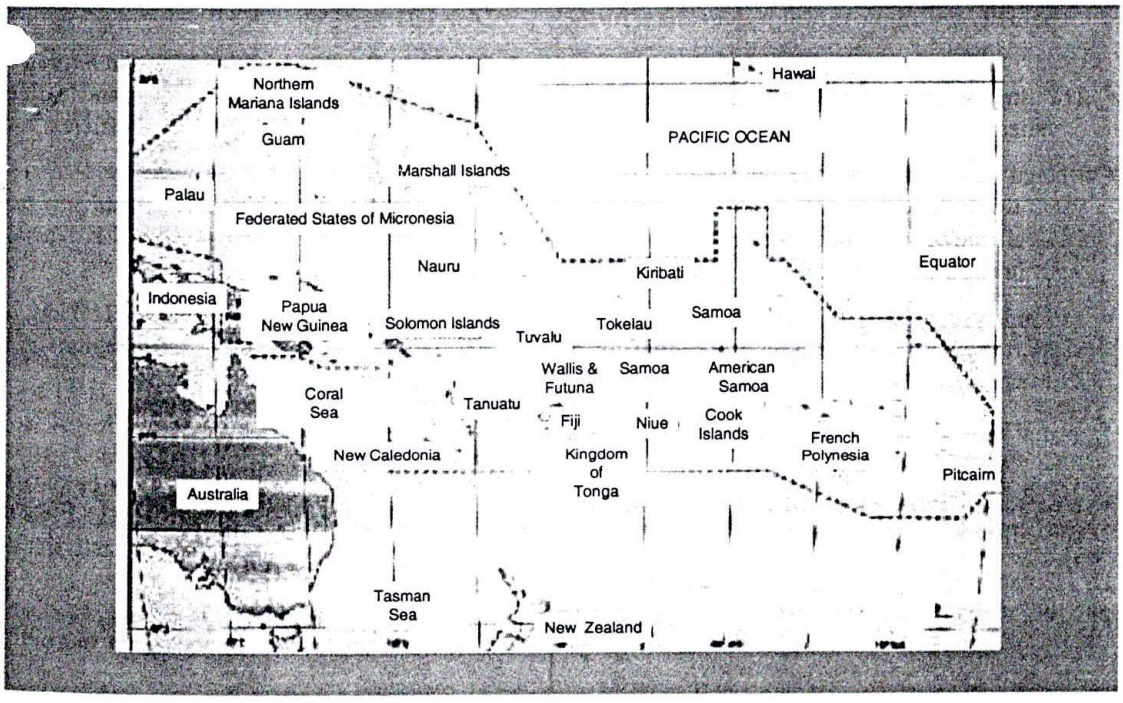
Dr Leda Hernandez, NFEP's Programme Coordinator, Department of Health, Philippines, introduced the Philippines as a tropical developing country with a dominant agricultural sector and a population of over 70 million people scattered on about 7000 islands in WHO's Western Pacific Region.

Filariasis was first identified there in 1907. By 1998 endemic areas were spread throughout the archipelago with a prevalence rate of 9.7% cases per 1000 population. New endemic areas recently registered some of the highest recorded infection rates.

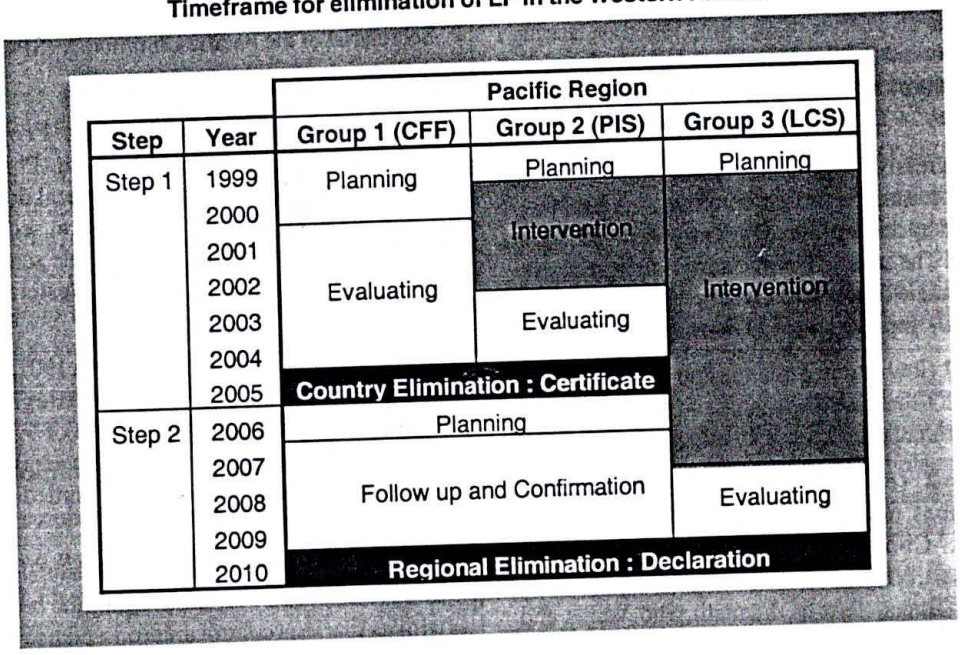
With WHO's declaration of "Filariasis Elimination as a Priority" in 1997, the programme began work with its filariasis control units on a plan to eliminate the disease in the Philippines. The first step was mapping of endemic areas, disease rates and other epidemiological data. (See *Filariasis in the Philippines, A Compilation of DOH Data, 1960-1998* for details).

After WHO's global call for Elimination of Filariasis in 1998, the programme shifted its strategy from control to elimination. Today, Dr Hernandez said, the main goal is to reduce the LF prevalence rate in endemic areas to less than 1 per 1000 population. The objectives are to:

Pacific Island members stretching from Palau in the west to the Pitcairn Island in the east



Timeframe for elimination of LF in the Western Pacific



Step	Year	Pacific Region		
		Group 1 (CFF)	Group 2 (PIS)	Group 3 (LCS)
Step 1	1999	Planning	Planning	Planning
	2000		Intervention	Intervention
	2001	Evaluating		
	2002			
	2003		Evaluating	
	2004			
	2005	Country Elimination : Certificate		
Step 2	2006	Planning		
	2007	Follow up and Confirmation		Evaluating
	2008			
	2009			
	2010	Regional Elimination : Declaration		

1) Identify all endemic municipalities within the next two years;
2) Provide mass treatment in established endemic municipalities; and
3) Continue surveillance of endemic areas for five years after completion of mass treatment.

Dr Hernandez highlighted major components of the NFCP as:

- Mapping of endemic areas using ICT and deformity surveys;
- Capability building through advocacy for participation;
- Training of health workers and community organizers;
- Annual mass treatment for a minimum of four years using the combination drug regimen of DEC-albendazole for all persons older than two years in established endemic municipalities;
- Morbidity control with municipal self-help support groups and surgical referral centres for hydrocoele cases;
- Integration with other public health programmes;
- Monitoring, evaluation and post-intervention surveillance.

Dr Hernandez cited the following indicators for progress to date in the Philippines:

1) **Diagnosis**: Rapid assessment methods used in endemic mapping.
2) **Treatment:** Mass treatment in three pilot sites. Results showed no significant barrier to proceeding with national implementation.
3) **Research:** A research agenda was prepared and disseminated to other health partners; rapid assessment studies conducted on ICT; ongoing health systems research.
4) **Database Development**: Recording/reporting forms; EPI-INFO FL database; publication of DOH Filariasis Data(1960-1998).
5) **IEC Plan**: Brochure entitled *Wipe Out Filariasis in the Philippines*, flipchart, posters and leaflets to advocate for support from local officials and endemic communities.
6) **Advisory Group**: Creation of a *National Advisory Group for Filariasis* composed of LF experts, academics, medical societies, etc.
7) **Human Resources Development**: Training of Trainers workshops in all endemic regions.

The challenge, said Dr Hernandez, is to start developing an efficient NFEP system, a feat in itself for a developing country. The task at hand will be to launch a high-profile activity to catch the attention of national political leaders and health managers, to institutionalize a "Filariasis Health Week" in endemic communities, to ensure funds, procurement and delivery of ICT cards, DEC and albendazole; to develop a module on morbidity

control; and to generate funds for information systems that would facilitate coordination and tracking of the programme's long-term effects.

"We need to remind ourselves once again of the need to eliminate this disease so that every child, present and future, in endemic areas can be free from the scourge of filariasis," she concluded.

Private Sector Partners: LF and the Case of a Gold Mine Manager in Papua New Guinea (PNG)

Presented by Mr James Cheyne (WHO) on behalf of Mr Arthur Hood, Misima Mines Ltd.

Mr Cheyne introduced this case study on behalf of Mr Arthur Hood, Misima Mines Ltd. in Papua New Guinea, with the purpose of providing a model for th le a private sector company could play in the delivery of public health sector programmes and show how it could support government priorities and capacity-building for mutual benefit.

Misima Mines Ltd. (MML), Mr Cheyne explained, was situated 600 kilometres south-east of Papua New Guinea's capital Port Moresby, on a small island in the Solomon Sea. In operation since 1990, it was 80% owned by the Placer Dome mining conglomerate and employed about 800 local residents out of a total population of 13 000 on the island.

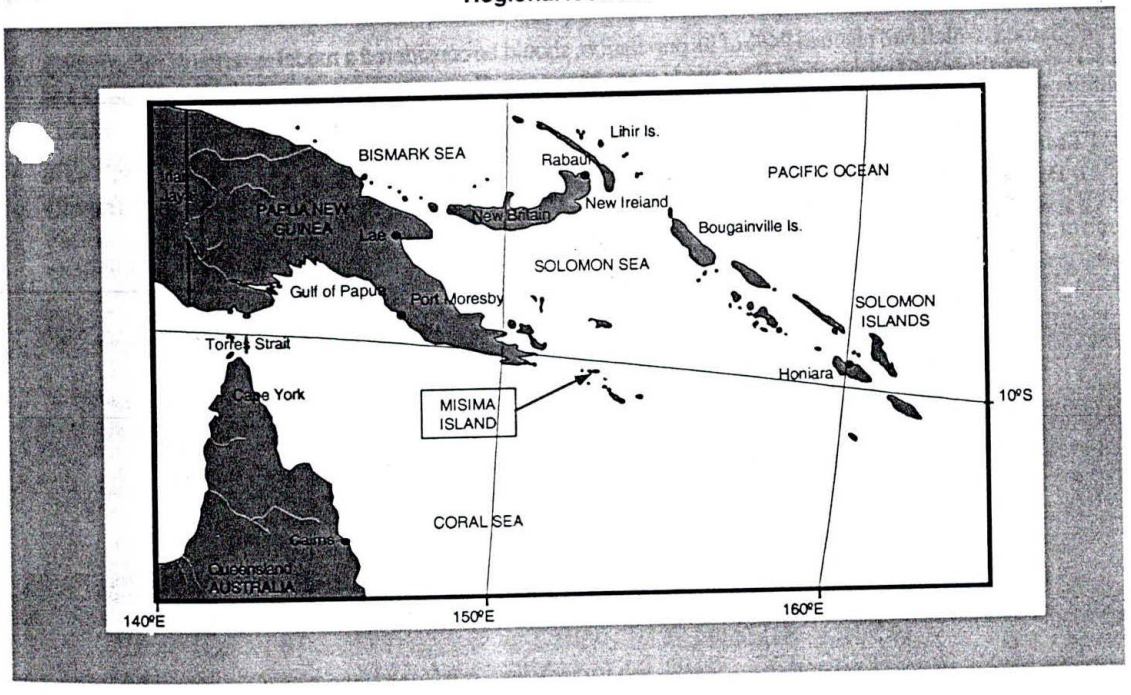
Over the past decade, due to a continuous decline in Papua New Guinea's Government service delivery capability, the private sector resource developers have found themselves filling the vacuum. After being approached by the WHO Collaborating Centre at James Cook University in 1995, MML was asked to provide support for a trial programme of work to test the effectiveness of three means of LF drug delivery.

Beginning on Misima Island, the programme expanded gradually throughout the district over three years to cover a population of some 40 000 distributed among many islands spread over some 80 000 square kilometres. The bottom line: the total cost turned out to be only US$ 0.30 per person treated. Drugs cost only US$ 0.04 per person per year meaning that it cost less than US$ 500 to treat the whole island. In future MML hopes to expand its health care initiative to include HIV/AIDS, immunization programmes, directly observed treatment, and a short-course against TB. MML would also like to see the LF programme expanded throughout the Province, a population of some 300 000 and is encouraging the Provincial Department of Health to do this.

Leave behind a better future!

This effort was all part of a broader Placer Dome corporate social-responsibility strategy to "Leave Behind a Better Future" and brought the parent

Regional location

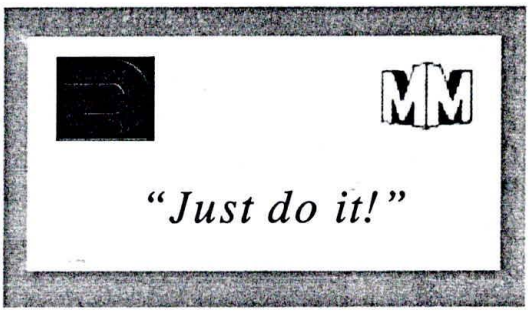


company in as a founding member of the World Alliance for Community Health.

While the LF programme had been a joint effort between MML and the Papua New Guinea Department of Health, MML provided the leadership and initial medical staff. Over time, the process shifted from "top down to bottom up" and was integrated horizontally under a delivery protocol entitled, "Educate – Delegate – Regulate – Motivate".

Now a WHO-approved project, MML's "enlightened self-interest" demonstrated what could be accomplished with a committed private sector partner whose motto is to "Just do it!", Mr Cheyne concluded.

Message from Misima Mines Limited



Video Synopsis of SmithKline Beecham video

Target LF: For a Future without Lymphatic Filariasis

Action began in Samoa on the eve of the new millennium and with the start of a new programme to eliminate LF there. The narrative then referred to the global situation – 120 million people in at least 80 countries affected, another billion at risk, especially children.

Private-sector support was highlighted, focusing on SmithKline Beecham's 1998 commitment to provide free drugs (albendazole) and Merck & Co., Inc.'s promise to extend its 13-year drug donation programme of Mectizan® (ivermectin) to combat LF as well in African countries where LF and onchocerciasis co-existed. Both commitments were open-ended – that is, for as long as was needed to eliminate LF from the world. The output in terms of drugs was described as "enormous".

The video made three "clincher" points:

- Donating drugs was by no means the end of the story;
- Distribution – getting the drugs to the people who needed them – was a real challenge; and
- Samoa, which had reached 94% of its population, should be considered a model in terms of information, drug supply and monitoring. The needs were exponentially greater in countries like Brazil, India and Nigeria.

"This is the way partnerships should work – beating back the diseases of poverty," said Dr David Heymann, WHO Executive Director for Communicable Diseases, commenting on the fragility of lives lived "on the margins of help."

Target LF:
For a Future without Lymphatic Filariasis

This 7-minute video presented by SmithKline Beecham provided an example of the sort of simple but effective media-marketing tools which could be used to help the Global Alliance raise both awareness and resources.

The video may be seen on the SmithKline Beecham website:
www.sb.com/lf/index3.htm

Copies of the video are available from SmithKline Beecham
(e-mail:brian.bagnall@sb.com)
by quoting either PAL or NTSC video formats.

Working Groups' Discussions

Participants divided into working groups focused on the following six themes: communication and information, creative ways of seeking LF support (including funding), the role of NGDOs, meeting country needs, critical elements for a successful LF programme, and maximizing regional coordination. This part of the agenda was a demonstration of the Global Alliance's principal function to *"...provide a free non-restrictive partnership forum for the exchange of ideas and coordination of activities"*[13].

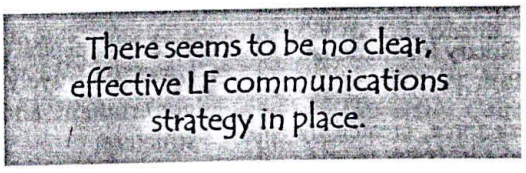
Working Group 1: Addressing Global Alliance Communications and Information Needs

Discussion leader: *Ms Brenda Colatrella, Merck & Co., Inc.*

Presenter: *Dr Philip Coyne, World Bank*

In identifying the Alliance's communication and information needs and assessing how they could best be addressed, the group began with some key messages:

- Communications were essential and could "make or break" the programme;
- Effective communications were a huge challenge; and
- Communications activities needed higher prioritization.



The group then presented some questions and observations:

- Where did the communications responsibility reside – with WHO or with the Alliance itself?
- There seemed to be no clear, effective LF communications strategy in place;
- The lack of definition and basic programme knowledge were causing confusion;
- Communications were not received by all partners in timely manner; no "filtering down";
- It was not feasible to have a "flexible, open structure" and, at the same time, committees with authority determined by only one partner;
- The lack of effective, ongoing communications resulted in increased costs and inefficiencies.

The following suggestions were then presented:

- A focal point should be designated/hired to manage effective and efficient communications for the Global Alliance;
- Funding for this function and person should be cost-shared by Alliance partners;
- A representative of each partner should be designated to solicit feedback and provide input;
- An Alliance website in addition to WHO's www.filariasis.org should be created;
- Communications should be regionalized/ decentralized wherever possible;
- A Global Alliance 'bulletin' should be instituted and discussions held on which partners should produce and disseminate it.

[13] Terms of Reference of the Global Alliance to Eliminate Lymphatic filariasis – Meeting report, 2 December 1999, London.

Working Group 2: Seeking Support (including funding)

Discussion leader: *Dr Brian Bagnall, SmithKline Beecham*

Presenter: *Dr David Molyneux, Liverpool School of Tropical Medicine LF Support Centre.*

It was suggested that the Alliance create a Development Task Force to undertake an assessment to analyse the needs of the Alliance, sources of support, needs of supporters, trends in philanthropy, the competition and the Global Alliance's market position.

This Task Force would then use the information gleaned to develop marketing plans which could include:

- Exploiting LF imagery;
- Establishing a brand image;
- Creating a global LF non-governmental organization to address the funding needs of *all* partners;
- Weaving human rights and social exclusion issues into the LF campaign;
- Recruiting prominent spokespersons;
- Implementing lessons learned from other programmes (e.g. polio, leprosy);
- Emphasizing the childhood and reproductive health aspects (i.e., LF as a disease which begins in childhood and is later an impediment to sexual and reproductive health); and
- Exploring opportunities to link up with major service organizations (e.g. Rotary International, Lions Club).

It was suggested that the task force, created by WHO acting as the Alliance's Secretariat, coordinate with LF support centres and report back within a year after wide-ranging consultation with Alliance members. Where appropriate, the Task Force would also use consultants in philanthropy, finance, public relations, and marketing.

Working Group 3: Defining the Role of Non-Governmental Development Organizations (NGDOs) in National Programmes to Eliminate LF

Discussion leader: *Dr Nevio Zagaria, WHO*

Presenter: *Dr Frank Richards, Carter Center Global 2000*

The group began by asking positioning questions for NGDOs (i.e., who, what, where, when, why and how they could contribute) and supplying the following answers:

Who **are the NGDOs relevant to the elimination of LF?** They consist of not-for-profits, private voluntary organizations (PVOs), special interest groups, lobbying/political action groups, international development, humanitarian and emergency relief agencies, international agencies, national and sub-national groups and local/community organizations.

What can the NGDOs do for LF?

What **can these NGDOs do for LF?** For the NGDOs involved in the LF elimination programme, a broad spectrum of attributes were identified, including:

- Demonstrated skills in facilitation, promotion and rapid response;
- "On the ground", community-based presence (often the only means of delivering services in remote areas or during periods of civil unrest);
- Role as providers of essential resources (e.g. financial, material, human, infrastructure);
- Status as a neutral (i.e., non political) party which remains relatively stable despite changes in the government and politically-driven MoH structure;
- Advocacy efficacy at all levels from community to business to national government to global governance;
- Focus on non-fatal diseases despite other health emergencies;
- Consistency, loyalty to the cause and sustainability;
- Crucial intermediary role in mass drug administration campaigns;
- Involvement in patient care, morbidity control, hygiene, surgery;

- Contribution to legal drug importation, tracking and accountability, inventory control (e.g. parallel use issue);
- Bridging function in communications between diverse partners;
- Technical expertise in areas such as planning, training, monitoring and evaluation.

***Where* could NGDOs work for LF?** Virtually all levels, from the broadest international level (e.g. governance) to regional and national coalitions to the state, district and community level ("grassroots"), as well as in cyberspace.

***When* should NGDOs be involved in the LF initiative?** At all stages, starting now, at the beginning of this new initiative. NGDOs should contribute to the MoH's planning of national task force structures, to the execution of programmes and to the monitoring and evaluation phase.

***Why* would NGDOs want to be involved in the LF initiative?** For a number of reasons; inter alia, because the LF initiative is:

- A "good fit" with their mandate (e.g. disease burden and geographic area);
- A "good programme" deserving of support;
- Compatible with other activities or strategies (e.g. community development, child survival, onchocerciasis, intestinal parasites, schistosomiasis, malaria, vitamin A).

***How* would NGDOs become involved in the LF initiative?** In their individual capacities or through coalitions. NGDOs need to feel that they are 'welcomed' at the table and are regarded as full partners in the programme. In this capacity, they can contribute substantially to LF advocacy. It is suggested that the Global Alliance advise the NGDO community that:

- There is an open invitation for their participation, that there are opportunities, roles and responsibilities in under-served endemic areas;
- There are resources or good 'prospects' to implement the NGDO programmes;
- They must conform to certain criteria (board structure, fiscal management, track record, etc.).

To maximize communications, a list of all potential partners should be developed.

Suggestions of the working group regarding NGDOs:

- In keeping with the LF Strategic Plan (September 1999) which asserts that "NGDOs are key partners" who "will play a critical role in LF elimination" and "given adequate funding, are likely to embrace the challenge of LF elimination with enthusiasm", it is suggested that this programme be developed as a "true" partnership; that is, that both WHO and relevant MoHs demonstrate the will to provide a welcome "place at the table", in full partnership status.
- In keeping with the LF Strategic Plan's objective 3.6.4.1 that "NGDOs in the LF endemic countries be made aware and be convinced of the importance of mobilizing and supporting local community activities for LF", it is suggested that the following targets be endorsed and promoted throughout the relevant NGDO community:
  - **By the end of 2000:** Development of information packages and promotional material in the appropriate languages for NGDOs working in LF countries; establishment of a formal network of NGDOs active in LF elimination to share experiences and exchange ideas.
  - **By the end of 2001:** Recruitment of increasing numbers of NGDOs.

Working Group 4: Meeting the Needs of Countries: How the Alliance can best support more effective country action

Discussion leader: Dr J. Gyapong, Ministry of Health, Ghana

Presenter: Dr Maged El-Setouhy, Ain Shams University, Cairo, Egypt

Advocacy: Help build a sense of urgency for LF programmes in countries, supported by WHO-Geneva, WHO regional offices, collaborating centres, and focusing on potentially endemic areas (which need to be convinced that LF is a problem). Provide leadership by collecting background disease-specific information and providing technical expertise. The Alliance should coordinate with its regional/country members and drive Global Alliance support down to country level.

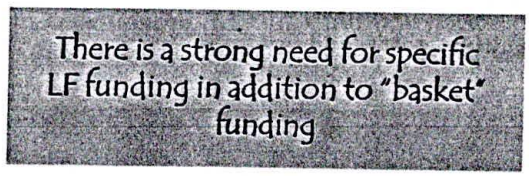
Regionalization: An LF focal point at WHO regional/country level was needed as people currently have so many responsibilities that LF priority is low. Funds should be provided for country start-up activities (mapping, training). For this, technical expertise was needed to provide, *inter alia*, assistance with the drug application process, identify training needs, etc. A regional synchronization of activities should be promoted with regional meetings organized and funded:

- **Strengthen regionalization:** NGOs, regional or country partners should create decentralized Allliance groups convened by WHO, the province, the country or the region. A list should be developed of all potential partners to maximize communications between local partners and MoHs; partners should be involved in country planning to build ownership.
- **Partner recruitment:** There must be a coordinated message, partner recognition, invitations and involvement and improved communications.
- **Regional meetings:** These should promote coordination and synchronization of activities, high coverage and uniform ramp-up of activities, mutual country motivation and friendly competition. They should also coordinate mapping, train countries on how to begin activities and implement the application process, etc., foster social mobilization strategies and coordinate communication (health reviews, newsletter, website).

Application process: The requirements should be simplified and streamlined, all the while fulfilling the requirements of the Programme Review Group, SmithKline Beecham, the Mectizan® Donation Program, and Merck & Co., Inc.

Country-specific activities:

- **Funding:** There was a strong need for specific LF funding in addition to "basket" funding of health needs (LF might not be high enough priority at MoH to get funds), as well as a need to develop expertise, to find specialty funds (mapping, personnel, training, development and production of IEC material); to provide disability prevention and rehabilitation funds and coordination; to fund drug costs, infrastructure and personnel; to ensure recurrent programme funds from year to year and to coordinate the roles of the private sector (e.g., Misima Mines).



- **Partner recruitment:** There should be a coordinated message, partner recognition/ invitations/ involvement and improved communications.
- **Multi-sector approach:** There was a need to integrate health activities, sharing costs, enhancing efficiency (monitoring, surveillance) and improving integration with other ministries, with research institutes and with other academic institutions. The Global Alliance could promote such integration.
- **Translation/interpretation:** There was a need to ensure that non-English-speaking countries were regarded as full partners in meetings, training opportunities, etc. through appropriate bi-/multi-lingual translation and interpretation services.

Working Group 5: Identifying Critical Elements for Successful LF Programmes

Discussion leader: Dr Leda Hernandez, Ministry of Health, Philippines

Presenter: Dr Patrick Lammie, Centers for Disease Control and Prevention, USA

The following eight elements were identified:

- **Political advocacy and commitment** from the international to the local level (trickle-down);
- **Baseline data:** Endemic mapping, prevalence, etc.;
- **Strengthening operational capacity:** Capacity-building through training of health personnel, long term funding, logistics (e.g. systematic inventory and distribution/quality assurance of drugs, laboratory and IEC supplies, systematic data information systems, programme monitoring and surveillance, develop-ment of materials for community mobilization, and inte-gration with other existing public health programmes);
- **Institutional frame-work:** Formal collaboration amongst government officials, expert groups, etc., including the Technical Advisory Group, expert groups at the international, regional and national levels, non-governmental organizations, ministries and inter- and intra-sectoral coordination;

- **Community mobilization**
- **Morbidity control:** IEC on morbidity (e.g. effective hygiene programmes), support groups;
- **Evaluation**
- **Sustainability** (five years minimum).

Working Group 6: Maximizing Regional Coordination

Discussion leaders: *Dr K. Ichimori, WPRO and Dr J. Ehrenberg, PAHO*

Presenter: *Prof. Charles Mackenzie, Mectizan® Donation Program*

The group began by defining a Regional ordinating Group as "a free affiliation of countries, a non-legal body", established to 1) review national plans and recommend on albendazole donation applications; 2) foster links through communication, coordination, advocacy and sharing of resources and, 3) interact with existing structures, such as WHO Regional Offices, TCC of APOC, and the SPC in Western Pacific, to their evolving needs.

The case for regionalization was then examined and a number of arguments set forth. The following responses were given to the question, "Why regionalize?":

- Closer to the problems; more insight into the viability of potential solutions;
- Able to respond more efficiently to local issues; more effectively to cross-border issues;

  Speedier drug application process;
- Easier to share experiences through regionalization;
- Already have the appropriate technical resources and facilities for sharing;
- Better positioned to deal with regional shipping issues;
- Well-placed to deal with accountability issues between drug companies and recipients;
- Able to capitalize on cultural similarities (e.g. language);
- Easier to mobilize regional funding sources;
- More readily able to cope with the financial aspects related to drug tariffs, etc.

The functions of a Regional Coordinating Group were perceived as follows:

- To recommend approval of drug applications;
- To coordinate information activities (e.g., communication, advocacy, information exchange through direct dialogue and electronic networks);
- To assist with the development of national plans;
- To organize and report on regional meetings, review progress and provide technical support;
- To mobilize resources (in cash and/or in kind);
- To facilitates supplies to countries (e.g. DEC, ICT cards);
- To activate political support for health-related legislation;
- To facilitate NGDO involvement.

In response to the question of how such a regionalization process would occur, the group found that a useful sequencing of approach would be to:

- Begin by devolving the decision-making for national drug approval applications for albendazole to the regional group;
- Then develop other functions (e.g. communication, information, resource mobilization) which would be specific to the needs, situations and circumstances within the region;
- Actively involve countries in the decision-making process;
- Enlist a member of the coordination group initially to facilitate idea flow and continuity;
- Suggest a framework to be presented at regional programme managers' meetings for which the country focal point solicits national opinion and reports back to the group.

The proposed membership of such a regional body would be comprised initially of:

- Representatives from countries within the region;
- A member of the existing Programme Review Group;
- Partners and potential donor-partners;
- WHO.

WHO, Geneva has an important role in fostering, facilitating and supporting regional groups.

Closing Statements

SmithKline Beecham

Dr Brian Bagnall, Director, Project Management, Lymphatic Filariasis Corporate Affairs, expressed SB's satisfaction with the rapid progress made since signing the Memorandum of Understanding with WHO only two-and-a-half years ago, setting the stage for other public/private sectors partners to create a broad alliance to eliminate LF. Now the Global Alliance was a reality and the first countries were already launching their programmes. Now, with the "massive new numbers" of tablets required to supply really large initiatives (e.g. the 40-million-person pilot project in India), he pleaded for advance planning – and patience as the company gears up production in the coming months..

SB was committed not only to supplying albendazole, he said, but also to other aspects of the initiative, such as company support staff and grants to support start-up projects. Finally, he announced that – although an imminent merger would transform SmithKline Beecham into Glaxo SmithKline within the coming months – the new corporate management would be equally committed to the LF Global Alliance.

Merck & Co., Inc.

The closing remarks were delivered by **Mr Charles Fettig**, Senior Director, Worldwide Human Health Marketing, who said he hoped that the LF programme would enjoy the same success as the onchocerciasis programme before it, one with which he had long been involved. He said that the donation of Mectizan® for the onchocerciasis programme over the past 13 years had opened his eyes to the medical needs of the less fortunate in developing countries. In October 1998, Merck & Co., Inc. also committed to extend this donation programme to LF in African countries where the two diseases (LF and onchocerciasis) co-existed. The significant lesson learned, Fettig said, was "the importance of partnerships in addressing public health problems in the developing world". The Global Alliance must include the participation of health authorities and governments, and should welcome, even seek, participation by NGDOs, the private sector, international organiza-tions and others. We must strive to improve com-munication," he said, "build trust, put aside our personal agendas and accept one another as full and equal partners in this LF alliance."

Mr Fettig received a standing ovation in recognition of his long years' service to the onchocerciasis and LF initiatives.

Although he would be retiring on 1 June 2000, Mr Fettig said he was sure that Merck & Co., Inc.'s participation, with Ms Colatrella representing the company and Dr Meredith representing the Mectizan® Donation Program, would be "in good hands". Mr Fettig received a standing ovation in recognition of his long years' service to the onchocerciasis and LF initiatives.

The World Bank

Dr Bernhard Liese, Senior Advisor, Human Development, Africa Region, gave the closing statement on behalf of the World Bank, saying that in order to deal seriously with poverty, the world's second largest disabling disease – namely, lymphatic filariasis – could not be ignored. He said it would be an uphill battle to build a constituency – a battle which would require stamina, strength and endurance.

Despite these challenges – and the clamouring of other urgent issues like HIV/AIDS, malaria and health sector development, the World Bank was committed to eliminating LF as a public health problem within the year 2020 target timeframe. "We must bring the human dimension to the forefront," said Dr Liese, pointing to the eagerness of the

onchocerciasis team to take on this related disease and give the LF programme the benefit of their experience. "It will be an endurance test," Dr Liese reiterated, "but, practically speaking, country financing is not a problem if the governments make LF a high enough priority."

The way ahead lies in partnerships, he continued, and building a broad constituency. Now the Global Alliance has been created. The World Bank stands firmly behind it.

Department for International Development, United Kingdom

Mr Phil Mason, representing the United Kingdom as a donor-partner, said that he had been impressed and "genuinely surprised by how much is already ing on. I want to record our positive views on the progress being made, particularity since the Partners' Forum in Geneva in October 1998. We have really come a long way". Noting that "great ideas need landing gear as well as wings", he felt that the Alliance's inaugural meeting showed that the wings were in good order and landing gear being defined with help from the working groups.

Mr Mason mentioned four messages he had gleaned from the meeting:

- **Sector-wide approaches:** He had often considered them as donor-created solutions to donor-created problems and recommended "thinking this through very carefully";
- **Value-added meetings:** The value and collegiality generated by forums like this was "vital and essential," he said, "the glue... that allows dialogue... and holds us accountable to each other";
- **Needs analysis:** The UK/DFID was still the only donor government attending the meeting. In order to encourage the active involvement of other donors agencies, there must be a clear 'product' to buy into. Mr Mason urged endorsement of the recommendation to conduct a needs analysis for the Alliance, and use the Liverpool School of Tropical Medicine LF Support Centre to do this quickly and at no extra cost to the Alliance. He hoped that, in approving the final report of the meeting, there would be agreement on "some clear steps forward".
- **LF's economic argument:** In 'selling' the LF initiative, Mr Mason agreed that "we need to make more of the powerful economic arguments...which show the economic and social benefits of people living LF- free lives, as well as the poverty angle" which positions LF as a disease which both causes, and is a consequence of, poverty. Both these points underpin why this initiative matters.

"Great ideas need landing gear as well as wings."

Mr Mason said that he had often seen the genesis of programmes and that they moved through three stages:

- someone dreams that it should happen;
- someone believes that it could happen;
- and someone wills that it must happen.

"We are at that third stage of genesis now," he said, having gotten there through the generosity of SmithKline Beecham. Now that there was a coherent, organized framework, "our task is to *will* that it must happen". After two years of hard work, Mr Mason concluded that "when the history comes to be written, this meeting may be seen as the real starting point for actually getting down to business."

Interchurch Medical Assistance (representing NGDOs)

Speaking as Vice-Chair of the NGDO Coordination Group for Mectizan® Distribution on behalf of the NGDOs, **Mr Paul Derstine,** IMA President, expressed appreciation for the tone of the Global Alliance meeting and for the dialoguing opportunities it had provided for more clearly defining the role of NGDOs in the LF elimination programme. In addition to the points raised by WorkingGroup 3, he put forth some related thoughts: firstly, the Global Alliance as "a three-legged stool" composed of public, private and non-profit partners, the latter needing a stronger presence in the LF programme. "During the course of the past two years, NGDOs have been shown a new world of opportunity with new tools to tackle an old health problem which has caused suffering and disability to millions of people," Mr Derstine said.

Although the NGDOs road had been "littered with unclear road signs", now with the creation of the Global Alliance, there would be better opportunities for meaningful involvement. He expressed the hope that WHO would assume a "more active role as a broker of intellectual capital" and rallying point for all partners. In conclusion, he said he hoped that the NGDO Coordination Group for Mectizan®

Distribution could use its good offices to expand the alliance through a workshop during the group's next bi-annual meeting 13-14 September 2000 at WHO headquarters in Geneva. Mr Derstine concluded by saying that the NGDO community was eager to be involved as an active partner and he urged the Alliance to follow the roles for NGDOs outlined in the LF Strategic Plan.

World Health Organization

Dr Maria Neira, Director, WHO Department of Control, Prevention and Eradication, began her closing statement in French to underscore the need for bi/multi-lingual communications. She highlighted the Alliance's public/private sector partnership as something "really unique – two very important pharmaceutical companies 'holding hands', along with the NGDOs".

She pointed to the need to focus resources on LF endemic countries and the people who would be the ultimate beneficiaries, saying that WHO's role was to act as a "platform, a facilitator to circulate ideas and generate energy".

SmithKline Beecham's pledge to donate drugs "shook the sleepy area of LF like an earthquake".

Turning to government supporters, Dr Neira again thanked the Spanish Government for its generosity and said that Spain and the UK should "compete to see who could help the most." She hoped that, by this time next year, all of the targets set (e.g. WHO's commitment to cover 15 million people at risk with LF programmes) would have been met. "I hope we shall be able to say, 'For once, we were *too* successful!'"

Rapporteur's Round-up

Dr Bernhard Liese (World Bank), the meeting's Rapporteur, began by pointing out that "this is a first" – the first meeting of the Global Alliance to Eliminate Lymphatic Filariasis – and thus a crucial first step which was felt by participants to have been a success.

Recapping the events that preceded it, Dr Liese highlighted the "constellation of factors" that paved the way for the formation of this alliance, in particular SmithKline Beecham's pledge to donate drugs that "shook the sleepy area of LF like an earthquake", the development of ICT cards to facilitate evidence-based disease mapping, and ground-breaking work to reduce morbidity and alleviate suffering.

"In two short years, a lot has happened," Dr Liese noted, highlighting comments by the meeting's opening speakers. First there was the "re-discovery of communicable diseases" and recognition of the fact that, even in this day and age, they accounted for 45% of global mortality.

Then there was the realization of the links between disease and poverty, especially "those at the end of the road, the rural poor" who constitute the majority of LF's victims. Finally, there was the growing appreciation by bilateral donors of a need for "new development paradigms" and a move from aid to partnerships. Important components of these included flexibility, an empirical approach and ownership by all participants.

The meeting's chairperson had "focused on what really matters", describing LF as a truly debilitating disease characterized not only by economic losses but also by social stigma. He equated disability with "denied opportunities" which limited life, lowered self esteem and were traumatic for those living with LF.

The global LF overview presentation stressed the importance of "walking on two legs," Dr Liese said – both the interruption of transmission and morbidity control. In the first area, substantial progress has been made in a short period of time, especially through the safety of drug combinations; in the second, a lot of work remained to be done. He singled out the comments on LF in children as "striking", saying that this had implications for new intervention channels.

Dr Liese then went on to recap the presentations of the Technical Advisory Group which focused on indicators for quality monitoring, DEC drug supply, morbidity and LF in children, and of the Programme Review Group which had encouraged the devolution of drug distribution to the regional level in future.

Highlights were selected from the second phase of the meeting which centered around regional and country overviews, singling out the need for more work in locating the disease as shown in Egypt. "Mapping is a first priority; partnerships are another," Dr Liese said, pointing out that virtually all regions and countries had underscored their importance.

On the challenges ahead, he singled out improvements in the weak infrastructures of ministries of health, especially in the largest and poorest LF-endemic countries; the importance of integrating disease treatment, the difficulties of social mobilization exacerbated by distance and illiteracy; and the importance of seeing LF control as "more than just drug distribution". The future will demand a "huge operational research agenda", he said.

The working groups were described as having featured "rich, engaged debate" after which there would be a need to consolidate the messages, highlighting the importance of mapping and epidemiology, morbidity control and integration of LF treatment with that of other diseases.

/o issues stood out for Dr Liese: firstly, the social impact of LF and the fact that it had so long been "a neglected disease"; secondly, his perception that LF control was less a matter of funding than of public health administration.

Looking to the future, he pointed to the need for broad-based partnerships, rapid progress to ensure on-site drug supplies, a strong continued commitment by pharmaceutical partners, in particular from Smith-Kline Beecham and Merck & Co., Inc., a more clearly defined role for NGDOs, a stronger regional focus, nd the need to bring new partners on board. DFID's crucial early support was recognized, as was that of the Liverpool School of Tropical Medicine LF Support Centre.

"To sum up," Dr Liese said, "the first big step has been made. The Global Alliance has moved from infancy to being a toddler – one with many parents, all of whom share commitment to a common cause." All these partners had committed to dealing with this disabling disease, to putting its elimination higher on the world's development agenda, and to restoring dignity, respect and health to its victims.

> "This is the way partnerships should work – beating back the diseases of poverty."
>
> – Dr David Heymann, Executive Director for Communicable Diseases, World Health Organization. (Extracted from the video presentation "Target LF: for a future without lymphatic filariasis")

Dr Liese concluded by saying that "In Santiago, the Global Alliance has been transformed from being an idea with a name – to a concrete reality."

Meeting Chairperson

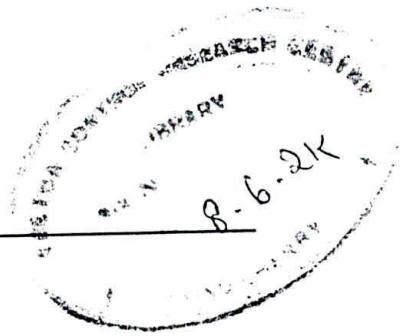
Mr Javid A. Chowdhury (India) claimed "the last word", saying that appointing him chairperson had "nudged India into making LF a central programme to be monitored and administered,." He was heartened by this evidence of solidarity and cross-sectoral cooperation towards a humanitarian cause, especially SB's generosity and commitment to the programme.

"This disease is effortlessly curable," Mr Chowdhury said. With the help of NGDOs, "we must convince the people, the rural peasants, to access treatment. However, he said, it would be "a long haul" for India and that interim target dates would be necessary between now and the year 2020.

Then Mr Chowdhury made a formal commitment on behalf of the Indian Government to launch "a pilot project with 40 million people and to achieve compliance with WHO's 2020 targets", starting with 20 million people already this year. "A major government effort will be crucial – it takes a massive build up in a country like India," he said, "but, in the end , we are dependent on our partners in the pharmaceutical industry; we will be helpless if the drugs don't arrive – and also on the quality of the NGOs."

"Our greatest anxiety is funding," he said, "and yet our needs are very modest – only about US$ 50 million – and here we have the World Bank, the most resourceful funder on earth, sitting right next to me."

He said that India would "contribute to the Global Alliance in a substantive way" and concluded by issuing an invitation on behalf of the Indian Government to host the second meeting of the alliance.



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TDR/Gen/97.1

Chagas disease

Leprosy

Lymphatic filariasis

Onchocerciasis

Prospects for elimination

TDR

TDR/Gen/97.1

Prospects for elimination

Chagas Disease
Leprosy
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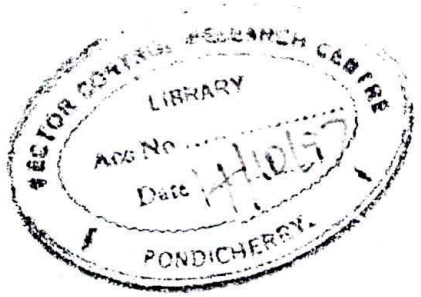


PROSPECTS FOR THE ELIMINATION OF SOME TDR DISEASES

Page

Introduction 3

Disease Elimination and Research Needs 3

LEPROSY 5

ONCHOCERCIASIS 11

LYMPHATIC FILARIASIS 17

CHAGAS DISEASE 23

Introduction:

Elimination or Eradication?

For the purpose of the present report, **eradication** of a disease is the reduction of worldwide incidence to zero as a result of deliberate efforts, obviating the necessity for further control measures. Similarly, **elimination** of a disease is the reduction of the morbidity to a level that does not constitute a major public health problem, but still requires a basic level of control and surveillance. This threshold varies from disease to disease and it is measured as a prevalence rate. For example, since many of the diseases have a zoonotic component they cannot be eradicated but can be controlled if they are reduced to a low target level.

Disease Elimination and Research Needs

1. There remains an unfinished TDR research agenda for each of the four diseases that can be eliminated - Chagas disease, onchocerciasis, leprosy and lymphatic filariasis - which should be continued either until elimination is achieved or until the research brings even better tools to bear on the problem, e.g. a macrofilaricide. One target is to show how to combine common interventions effectively for different diseases, e.g. bednets for malaria and filariasis, ivermectin for filariasis and onchocerciasis, and spraying for local control of the vectors of several diseases. Another is to develop more specific and sensitive tools for surveillance and evaluation of impact.

2. It will be essential to invest for a period of 8-10 years to reduce each of the four diseases - Chagas disease, leprosy, onchocerciasis and lymphatic filariasis - to a level which assures that they are unlikely to re-emerge and will no longer be major public health problems. In certain focal areas, the effort at eradication may be worth undertaking, as in the case of leprosy or onchocerciasis. The failure to make that investment will lead to real risk that elimination will not be achieved and that prior investments in research and control may be wasted.

3. The defined time to elimination as a public health problem represents a special case intervention, since the cost of eliminating the last cases of any disease is never cost-effective in itself. The framework for the economic analysis should be the savings, not in one year, but over the remaining century or more that the diseases are no longer major public health problems. Here the issue of discounting should be reconsidered, because recurrent costs are permanently eliminated or reduced.

4. The efforts directed towards elimination of TDR diseases have certain features in common, e.g. the need for tests of high specificity for surveillance, and the likelihood of the diseases remaining for long periods in remote areas and areas of conflict or declining social cohesion. There is thus good scope for cross fertilization and economization between the elimination efforts for different diseases.

5. Elimination as a public health problem will also require an increase in operational research to solve problems in the field and improve surveillance, which is essential to avoid risks of re-emergence and to assure the aims of the programmes have been achieved for a finite period. Monitoring is required as much for "disappearing diseases" as for newly emergent diseases, and sentinel sites and continuing support for the activity and flexible responses to hot spots will be required.

6. Global travel and immigration will remain continuing threats to the elimination of these diseases, and special efforts to maintain surveillance must be made.

7. While elimination implies some level of national vertical planning, to be effective, these programmes must be integrated at the district and community level. For some, treatments are sufficiently simplified and safe that they can be carried out at the community level by the community itself, e.g., onchocerciasis.

8. There are costs to a health service in terms of dislocation and disruption and diversion of personnel to elimination programmes. These should be anticipated, and planned and compensated for, from the beginning of a programme. Resources should be set aside and incorporated into elimination programmes, and used to assure that other important health and control functions are not compromised by elimination programmes. Expertise that would be difficult to redevelop in the case of future needs should also be maintained at a certain level.

9. Furthermore, there must be a plan for devolution of the disease programmes and services as the diseases are eliminated, and alternative training for scientists and health workers involved must be planned for from the beginning.

10. The development and maintenance of geographic information systems will be important for elimination activities.

11. Education and communication training and packages will be essential for assuring effective programmes at the community level.

12. Experience to date indicates the importance of modelling as a scientific and control tool; improved models can facilitate evaluation and monitoring of disease elimination both locally and globally.

13. TDR has anticipated the transition of leprosy, onchocerciasis, lymphatic filariasis and Chagas disease from major research problems to a level of research required to assure disease elimination, and they represent now less than 22% of the TDR budget.

14. At the same time, elimination of leprosy, onchocerciasis, lymphatic filariasis and Chagas disease as public health problems will require an investment of new, specially planned research funds for a finite period of time. The investment in disease elimination must be for a defined period, but one sufficient in time and magnitude to assure disease elimination, prevent recrudescence and maintain surveillance.

LEPROSY

1. The disease

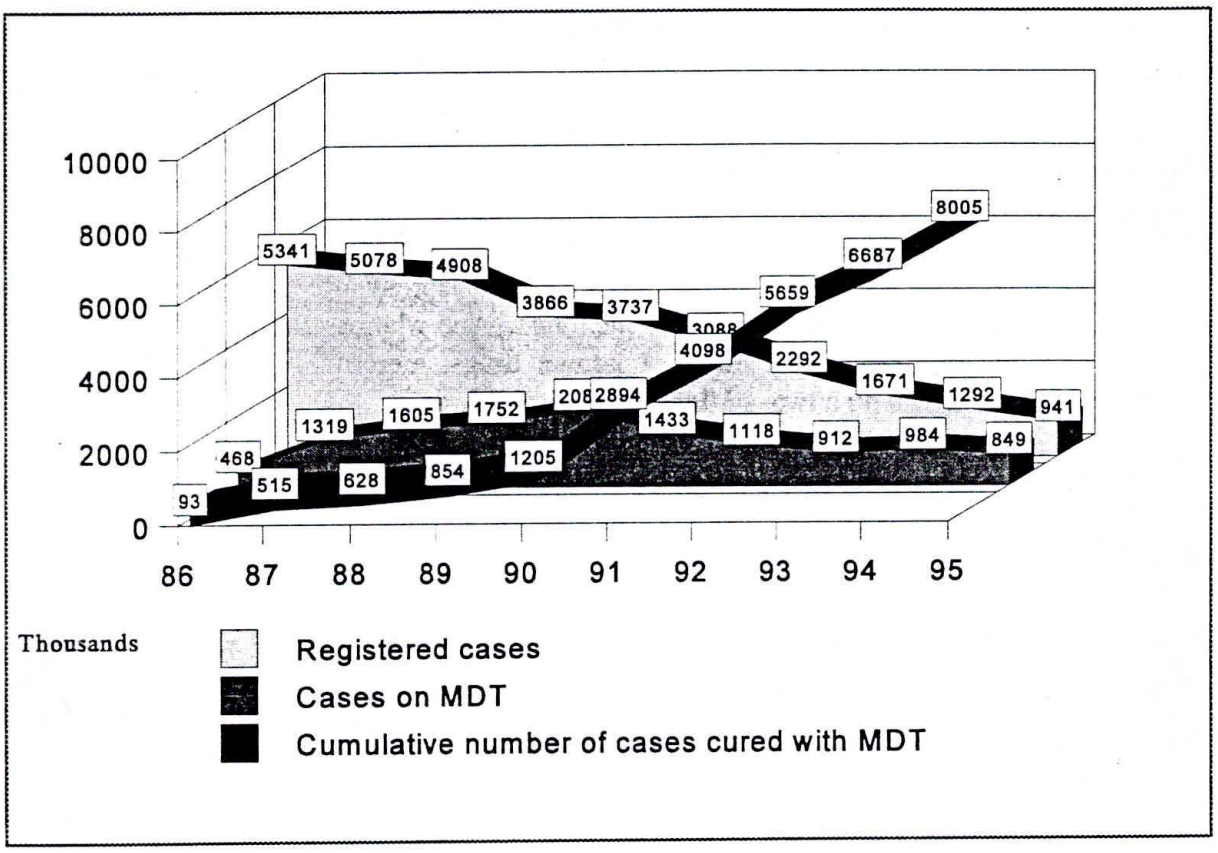
Leprosy is a chronic communicable disease caused by the bacillus *Mycobacterium leprae*, which is closely related to the *M. tuberculosis* bacillus that causes tuberculosis. Both diseases are believed to be transmitted through bacteria-laden droplets form the nose and throat, and have been treated with the same or related drugs. In both cases, treatment has been lengthy; compliance has been a problem; and the development of drug resistance has threatened control. However, the two organisms have very different targets - leprosy affecting mostly the skin and peripheral nerves, and tuberculosis mostly the lungs. And whereas strains of *M. tuberculosis* have developed multi-resistance to most known drugs, mercifully leprosy is being very effectively controlled with a two- or three-drug combination.

Leprosy presents a great variety of forms depending on the individual immune response to the infection and its duration. Most infections appear to remain symptomless. At one end of the disease spectrum is *lepromatous* leprosy, in which cell-mediated immunity to leprosy is absent (though present in infections with other agents) and where *M. leprae* bacilli multiply uncontrolled, leading eventually to damage to mucous membranes, the eyes and peripheral nerves, and ultimately to deformity. At the other end of the spectrum is *tuberculoid* leprosy, in which the immune system has control of the infection, few bacteria can be found, and the symptoms are mild, often taking the form of desensitized, pale and sharply defined skin patches. *Tuberculoid* leprosy is usually self-limiting, but can sometimes lead to peripheral nerve damage. *Lepromatous* cases are thought to be the main source of transmission of the disease.

In control programmes, for choice of drug regimen, cases are generally divided into two groups: *paucibacillary* cases, which broadly coincide with cases of tuberculoid leprosy; and *multibacillary* cases, which broadly coincide with cases of lepromatous leprosy. But much finer divisions and distinctions are also possible.

2. Disease situation and trends

The prevalence of this disease has been reduced from 5.4 million in 1985 to 940 000 in 1996 and the number of patients cured with multidrug therapy (MDT) was more than 8 million at the end of 1995 (Table 1 and Figure 1).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854
628
515
468
93
Thousands
Registered cases
Cases on MDT
Cumulative number of cases cured with MDT

Figure 1

Table 1

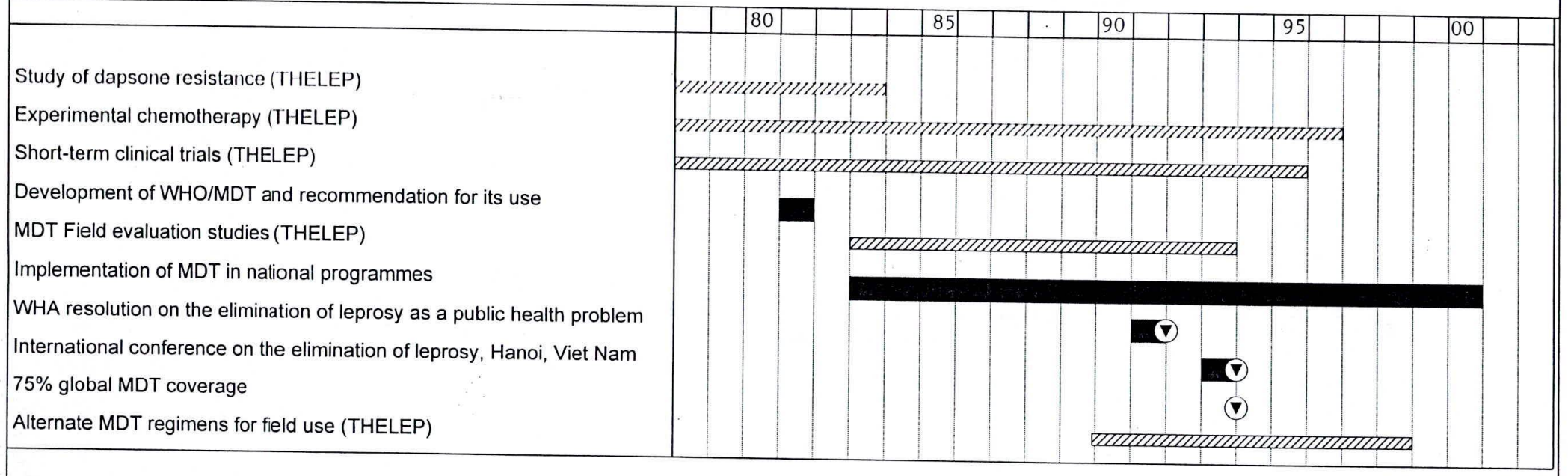
Leprosy prevalence and MDT coverage by WHO Region, 1996 (*)

WHO Region	Registered cases	Prevalence per 10 000	Cases on MDT	MDT coverage (%)	Cured with MDT Cumulative Total
Africa	92 517	1.70	85 942	92.9	450 877
Americas	163 277	2.15	123 366	75.6	225 450
South-East Asia	635 490	4.61	595 301	93.7	7 059 926
Eastern Mediterranean	18 188	0.43	16 738	92.0	55 919
Western Pacific	31 043	0.19	27 874	89.8	213 019
TOTAL	940 515	1.69	849 221	90.3	8 005 271

(*) excluding the European Region

Figure 2:

Tow rds the elimination of Le rosy: The Timetable



3. Strategy for elimination

It won't be long before the question of whether to work actively towards a leprosy eradication strategy will arise, but the tools currently available and the existing knowledge on the subject do not permit such a strategy. If eradication is to be seriously considered, the first step would be to embark on research to develop laboratory tools that can identify "at risk" groups as well as intervention tools to carry out the task.

What would be the cost-effectiveness of this research, particularly in relation to the gains to be made by completely stopping the occurrence of leprosy? If the costs of such an eradication strategy prove to be very high, investment in the research could turn out to be questionable.

On the other hand, beyond the year 2000, even with the success of the elimination strategy, there may be a felt need, at least in some parts of the world, to totally eradicate leprosy within a short period of time. This would require a strategy based on: (a) epidemiological surveillance of the small numbers of cases that may continue to occur, and, more importantly, on surveillance of subclinical infection in the population; and (b) effective interventions to abort subclinical infections apart from curing the occasional disease. The most important consideration in this strategy is cost-effectiveness, which requires that technologies for identifying subclinical infection (laboratory tests) and interventions (e.g. vaccines) be simple, affordable and acceptable to the community. As with the current elimination strategy of identifying and treating clinical leprosy, identification of and interventions for subclinical infection will be quite a challenging task for difficult-to-access areas and populations. Thus the need to invest in leprosy research even beyond the year 2000 is quite obvious.

4. The timetable towards elimination

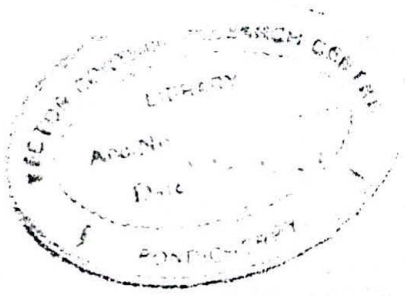
The main landmarks are indicated in Figure 2 (control activities shown as solid bars, research activities as hatched bars) and can be summarized as follows:

1978-1984: Study of Dapsone resistance
1978-1996: Experimental Chemotherapy (e.g. Minocycline, Ofloxacin)
1978-1996: Short-term clinical trials
1981-1982: Development of MDT and recommendation for its use
1982-1994: MDT field evaluation studies
1982-2000 and beyond: Implementation of MDT in national programmes
1991: WHA Resolution on the elimination of leprosy as a public health problem
1994: International Conference on the elimination of leprosy Hanoi, Viet Nam
1995: Achievement of 75% Global MDT coverage
1998: Alternate MDT regimens for field use

5. Future Research Needs

Diagnostic tools to identify subclinical infection:
- to monitor transmission,

Vaccine development:
- to prevent infection/disease.



ONCHOCERCIASIS

1. The disease

Onchocerciasis is an important public health and socio-economic problem, especially in Africa where over 99% of all infected persons live. The most severe consequence of onchocerciasis is blindness, which may afflict over one third of the adult population of the most affected communities. Another important problem is severe skin disease associated with maddening itching which cause great suffering to millions of people according to recent TDR research.

2. Disease situation and trends

The Onchocerciasis Control Programme in West Africa (OCP), which was launched in 1975 and extended in 1989, covers the savanna areas of 11 West African countries. The principal control strategy has been vector control and this has been highly successful in interrupting transmission of the disease. Onchocerciasis is now under full control throughout the OCP area. Some 1.5 million people, originally infected, are no longer so; an estimated 125 000-200 000 people have been prevented from going blind; 30 million people are no longer at risk of infection and blindness, and 25 million hectares of land have been made available for settlement.

In the endemic countries in Africa outside the OCP, there are an estimated 15 million people infected with *Onchocerca volvulus*, representing 85% of all infected people in the world today. It has been estimated that, in 1990, 335 000 persons were blind as a result of onchocerciasis (40 000 new cases of blindness per year), 4-6 million were affected by skin lesions, and more than 6 million people were suffering from troublesome itching. Unfortunately, aerial larviciding was not considered technically feasible or cost-effective outside the OCP, and virtually no action used to be taken to control the disease in the non-OCP countries. This changed when ivermectin was introduced in 1987 and made available by the manufacturer, Merck, Sharp & Dohme, free of charge and for "as long as needed". Several endemic countries, supported by a group of international non-governmental organizations, have started ivermectin-based control and it was estimated that, in 1994, some 15 percent of those infected outside the OCP areas received ivermectin treatment.

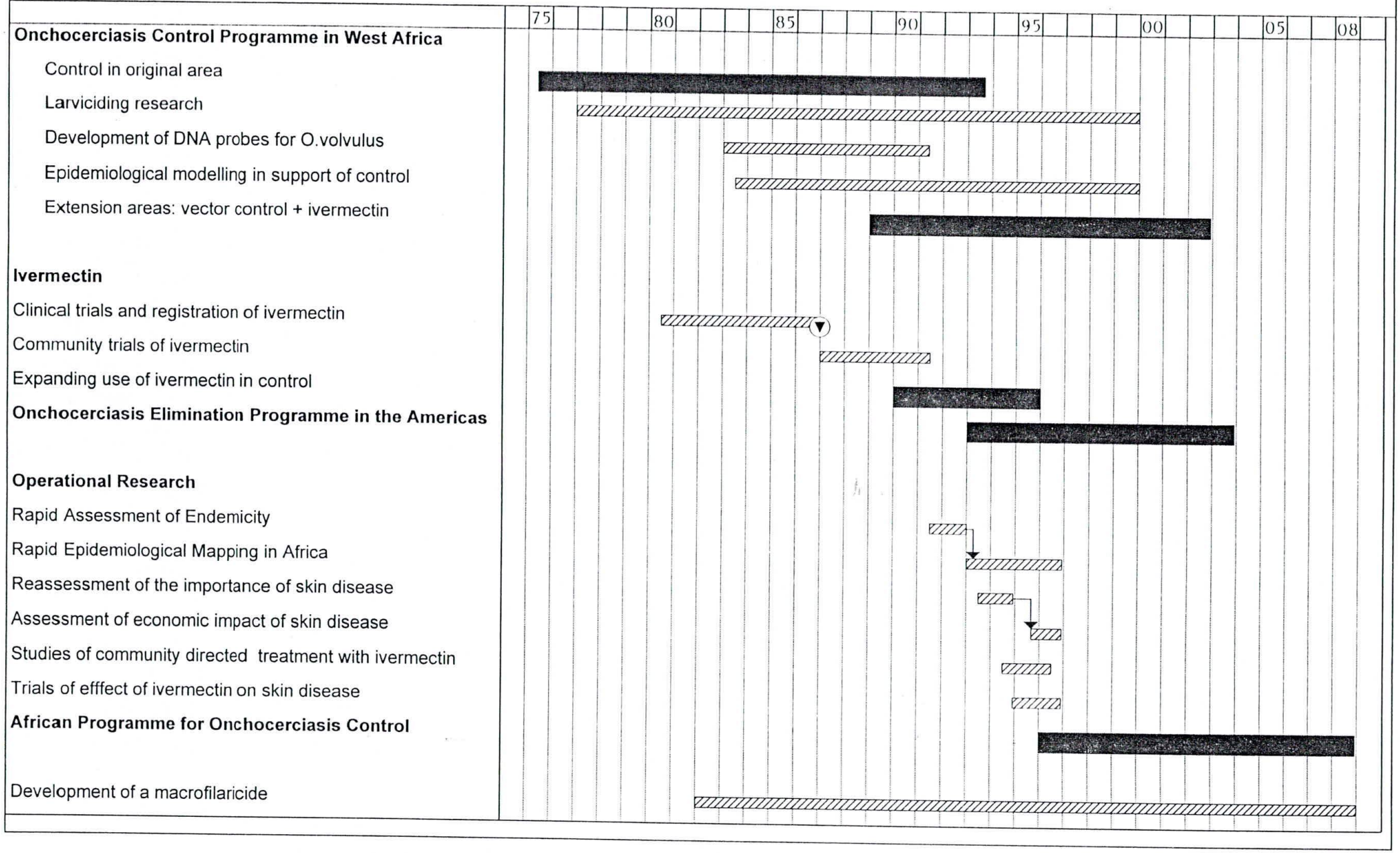
3. Strategy for elimination

It is expected that global elimination of onchocerciasis as a public health problem will be achieved during the next decade as a result of the control operations of the OCP and of two recently created international onchocerciasis control programmes. The time frame of the different control operations and of the major supporting research activities is given in Figure 3 (control shown as solid bars, research as hatched bars).

In the OCP, onchocerciasis is no longer a public health problem. Nevertheless, vector control, supported by ivermectin treatment, will continue in some areas until the year 2002 to ensure that the parasite reservoir is virtually eliminated and that the risk of recrudescence of the infection is minimal throughout the OCP area.

Figure 3:

Towards the elimination of Onchocerciasis: The Timetable



Outside the OCP, onchocerciasis control will be mainly based on ivermectin treatment. Assuming that ivermectin treatment is equally effective against the skin manifestations of onchocerciasis as it is in the prevention of ocular disease and onchocercal blindness, the disease can be eliminated as a public health problem from all communities where adequate ivermectin treatment coverage is achieved and sustained. However, large-scale ivermectin treatment does not result in interruption of transmission and treatment will therefore have to continue for a very long time, even after the disease is no longer a problem of public health importance.

In 1993, the Onchocerciasis Elimination Programme in the Americas (OEPA) was launched. OEPA covers all six endemic countries in the Americas and the control strategy is also based on ivermectin treatment. OEPA is scheduled to come to an end after a period of 10 to 15 years. The residual control activities required after this period have not yet been defined.

A new African Programme for Onchocerciasis Control (APOC) has been created to cover all endemic African countries outside the OCP area. It has the objective: "to establish, within a period of 12 years, effective and self-sustainable community-based ivermectin treatment throughout the remaining endemic areas in Africa and to eliminate the disease by vector control in selected foci". APOC control operations are expected to begin in 1997.

TDR undertook an extensive operational research programme to prepare the technical basis for APOC. Among the issues addressed were the development and application of rapid methods to locate all high-risk communities requiring treatment, the psycho-social and public health importance and economic impact of onchocercal skin disease, the effect of ivermectintreatment on onchocercal skin disease and troublesome itching, sustainable approaches to community-directed treatment, simple methods for monitoring control and the feasibility of vector eradication from isolated foci.

If the OCP is brought to a successful conclusion as scheduled by the year 2002, and if both APOC and OEPA achieve their objectives within the planned period, the global elimination of onchocerciasis as a public health problem will be achieved before the year 2008. However, the parasite reservoir will not have been eliminated by that time, and residual control activities will be required to ensure that the achievement of elimination is sustained.

4. Research for eradication of onchocerciasis

The risk of resistance to ivermectin is remote within the time frame of APOC and OEPA. However, the history of parasite disease control based on chemotherapy suggests a cautious approach should be adopted, and recent model simulations and molecular biological studies indicate that resistance could become a problem over a 20-30 year time period. It is important, therefore, to continue the development of alternative drugs for the treatment of onchocerciasis. Particularly useful would be a macrofilaricidal drug which kills or sterilizes the adult worms, thus ensuring a more definite impact of control on the reservoir of the parasite and possibly achieving its eradication. The development of a macrofilaricide is the mandate of the MACROFIL project which is funded jointly by OCP and TDR.

In order to assess whether the eradication of onchocerciasis would be feasible if a macrofilaricide became available, a computer simulation study was undertaken by the Centre for

Decision Sciences in Tropical Disease Control (CDTDC) of Erasmus University of Rotterdam using the microsimulation model ONCHOSIM. The long-term impact of mass treatment with a macrofilaricide on the parasite reservoir and transmission was simulated under realistic assumptions of drug efficacy (with efficacy defined as the percentage of macrofilariae killed or sterilized at each treatment) and treatment compliance. Eradication was defined as the attainment of an epidemiological situation in which the probability of recrudescence of the disease after cessation of control is less than 1%. The results of the simulations were compared with the predicted long-term impact of repeated ivermectin treatment on the parasite reservoir and transmission.

Though ivermectin is principally a microfilaricide, it also has an effect on the adult worms. In the analysis of five-year follow-up data from the community trial in Asubende (Ghana), it was found that the trends in microfilarial counts could only be explained by assuming an irreversible reduction in fecundity of female worms of about 35% (*Journal of Infectious Diseases*. 1995,172:204-10). Thus, ivermectin can also be considered a macrofilaricide but with a modest efficacy of 35%. However, according to the model predictions, it would take up to 50 years with annual ivermectin treatment at a coverage of 65% of the total population (typical for coverage with annual treatment in the OCP areas), or more than 15 years with six-monthly treatment to achieve eradication.

The results of simulations for more powerful macrofilaricides with efficacies of between 60% and 90%, and administered at six-monthly intervals, are shown in Figure 4. The simulation is for a highly endemic focus with a community microfilarial load (CMFL) of 70 mf/skin-snip. The dashed line shows the prospects of eradication by ivermectin treatment. The solid lines show the combination of intervention period and treatment coverage required to achieve eradication using macrofilaricides with assumed efficacies of 60%, 75% and 90% respectively. When compared to ivermectin, a dramatic reduction in the required duration of control can be realized even with a drug which kills only 60% of the worms (leaving the other 40% unaffected). However, at a coverage level of 65%, a period of four years (drug efficacy 90%) to seven years (efficacy 60%) of six-monthly treatment is still needed.

The above results are based on the assumption that treatment compliance is random, i.e. that for each individual in the population, at each administration round, the probability of being treated is the same, irrespective of attendance or non-attendance at previous rounds. This is clearly not realistic and in order to explore the importance of systematic non-compliance, a second series of simulations was done using the extreme assumption that a certain percentage of the population never gets treated (because of non-compliance or contraindications against the drug). The results are shown in Figure 5. The solid line is for a macrofilaricide with 75% efficacy and random compliance, similar to that shown in Figure 4. The dashed line is for the same macrofilaricide but assuming systematic non-compliance in all cases. For this line, a coverage of 0.9 means that 90% of the population always gets treated while 10% never receives treatment. Figure 5 shows that the predicted feasibility of eradication depends greatly on the assumptions made with respect to compliance. If non-compliance is mainly systematic, eradication is not attainable under realistic assumptions of treatment coverage and within a reasonable period of time.

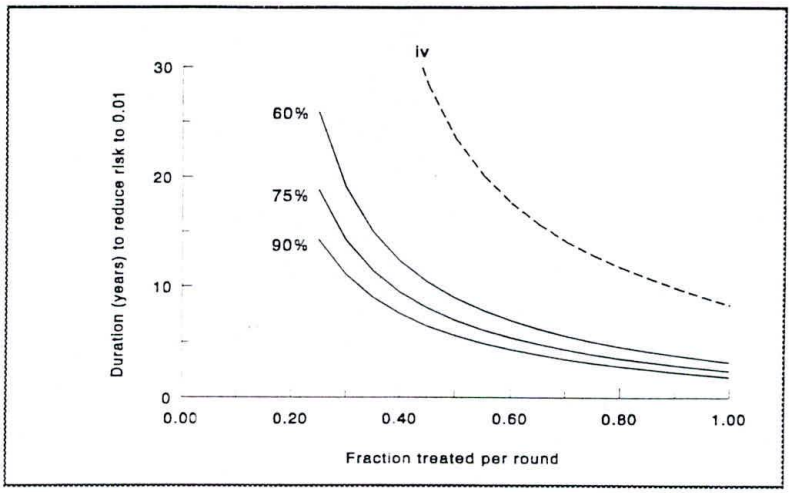


Figure 4: Potential of a macrofilaricide (solid lines) vs. ivermectin (dashed line) for the eradication of onchocerciasis. Lines indicate the combination of duration of control (Y-axis) and treatment coverage (X-axis) which leads to eradication (i.e. recrudescence risk = 1%). Above each line, eradication is almost certain; below the line, recrudescence is likely. Treatment frequency is two times per year. The percentages denote the drug-efficacy (% of worms killed per treatment).

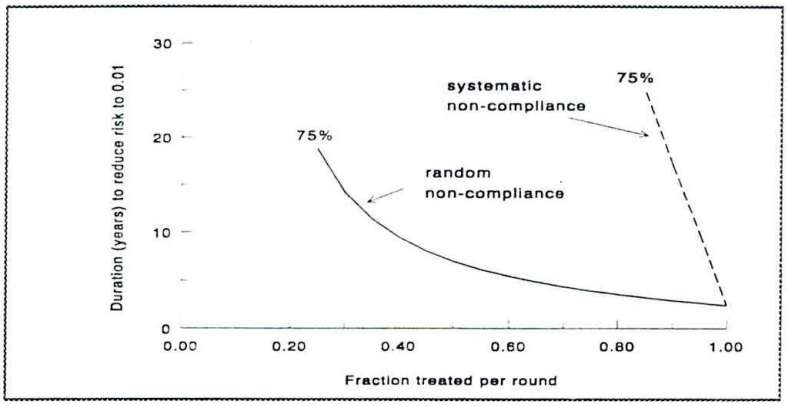


Figure 5: Potential of a macrofilaricide for the eradication of onchocerciasis. Lines indicate the combination of duration of control (Y-axis) and treatment coverage (X-axis) which leads to eradication (i.e. recrudescence risk = 1%). Above each line, eradication is almost certain; below the line, recrudescence is likely. Treatment frequency is two times per year. The drug is assumed to kill 75% of the worms per treatment. The solid line denotes a situation of random non-compliance; the dashed line a situation of systematic non-compliance (see text for details).

In conclusion, when eradication of the parasite is the primary objective of control, there is a definite role for a macrofilaricide in addition to ivermectin. However, an important requirement for such a drug is that it should not have major contraindications which would lead to systematic exclusion of certain population groups, and it should not be accompanied by severe side effects which could lead to non-compliance at later treatment rounds. These operational aspects, in addition to the need for obtaining and maintaining a high treatment coverage, appear more important for the feasibility of eradication than improvements of 5%-10% in the macrofilaricidal efficacy of the drug.

5. The timetable towards elimination

The main landmarks are indicated in Figure 3 (control activities shown as solid bars, research activities as hatched bars) and can be summarized as follows:

Onchocerciasis Control Programme in West Africa

1975-1993: Control in original OCP area
1977-1999: Larviciding research
1983-1992: Development of DNA probes for *O. volvulus*
1983-1999: Epidemiological mapping in support of control
1989-2002: Vector control+ivermectin in extension areas

Ivermectin

1980-1986: Clinical trials and registration of ivermectin
1987-1991: Community trials of ivermectin
1990-1995: Expanding use of ivermectin in control
1993-2003: Onchocerciasis Elimination Control Programme in the Americas

Operational Research

1991-1992: Rapid assessment of endemicity
1993-1996: Rapid epidemiological mapping in Africa
1993-1994: Reassessment of the importance of skin disease
1995-1996: Assessment of economic impact of skin disease
1994-1996: Studies of community-directed treatment with ivermectin
1995-1996: Trials of effect of ivermectin on skin disease
1996-2008: African Programme for Onchocerciasis Control
1982-2008: Development of a macrofilaricide

LYMPHATIC FILARIASIS

1. The disease

Infection with filarial parasites may lead to elephantiasis, a dramatically disfiguring disease usually affecting one or both legs, or to hydrocele, an equally grotesque inflation of the testicles. Infection can also cause acute fevers, inflammation of the lymphatic system, and the bronchial-asthmatic condition known as "tropical pulmonary eosinophilia".

The most widespread filarial parasite is *Wuchereria bancrofti*, which affects about 106 million people in the tropical areas of Africa, India, South-East Asia, the Pacific Islands, and South and Central America. India has by far the largest number of cases. The closely related *Brugia malayi* and *Brugia timori* affect 12.5 million people in South-East Asia.

The parasites are transmitted by mosquitos. In rural areas, particularly in Africa, *W. bancrofti* is transmitted by *Anopheles* mosquitos - a genus which also includes species that transmit malaria. In cities, widespread species of *Culex* mosquito, which can breed in latrines, sewage, and ditches, are major vectors. In the Pacific region, *Aedes*, a genus which includes species that transmit yellow fever, dengue, and dengue haemorrhagic fever, and which can breed in tiny amounts of clean water in the axils of plants, up-turned containers or old tyres, transmit the parasite. *B. malayi* is mostly transmitted by *Mansonia* mosquitos.

Adult worms or "macrofilariae", both male and female, settle into the lymphatic system and take 3-15 months to mature. They survive in the body for 4-8 years. Once established and fertilized, the females constantly produce large numbers of larvae known as "microfilariae", which invade the blood stream. From there, the mosquito host can ingest them with a blood meal and transmit them to another person. The larvae metamorphose through a sequence of larval forms before becoming adults.

The vast majority - millions - of microfilariae, however, remain in the body as immature forms, and die after some six months to two years. These sizable creatures - each up to a third of a millimetre long (and times some millions, that amounts to several kilometres of worm) - moving, secreting, excreting and dying as foreign bodies, can do immense damage and place an enormous burden on the host. The adults are several centimetres long and block lymphatic ducts. A combination of these effects, complicated by bacterial super-infections, causes the symptoms and pathology of the disease.

2. Disease situation and trends

Figures on global prevalence of infected and disease cases are shown in Table 2 below. The burden of disease due to lymphatic filariasis amounted to 0.85 million DALYs (0.56 million for men and 0.29 million for women) in 1990, and the disease has been identified as the second leading cause of permanent and long-term disability (WHO World Health Report, 1995).

3. Strategy for elimination

The following points are considered as the basis for the future development of a global strategy aimed at the elimination of this disease:

- The most important recent achievement leading to new optimism for successful control of lymphatic filariasis is the simplification of the recommended therapeutic regimens. Specifically, it is now recognized that a *single* dose of DEC (6 mg/kg) achieves essentially the same result as the long-recommended two-week course of this drug, i.e., a 90-95% reduction of circulating microfilariae even one or two years after treatment. Single-dose ivermectin (400 mcg/kg) is equally effective as single-dose DEC, and the *combination* of single doses of these two drugs appears to be the most effective regimen tested so far (with reductions to less than 2% of pre-treatment microfilaraemia levels two years after treatment). Actual utilization of these single-dose, once-yearly regimens in community treatment programmes has confirmed both their therapeutic effectiveness (figures 6 and 7) and their social acceptability. Thus, use of DEC or ivermectin alone or in combination once a year is a newly recognized control strategy for lymphatic filariasis that promises to be at least as effective as the once-a-year dose of ivermectin currently in use for onchocerciasis.

Table 2: Prevalence of lymphatic filariasis infection and disease

Disease due to *Wuchereria bancrofti* (figures in thousands)			
WHO Region	Population at risk of infection	Population infected	Number of disabled[a]
AFRO	260 300	40 424	14 800
AMRO	6 680	395	90
EMRO	3 700	342	117
SEARO	518 880	54 967	21 220
WPRO	113 270	10 483	3 690
Total *Wuchereria bancrofti*	902 830	106 611	39 917
Disease due to *Brugia malayi*			
SEARO	203 060	6 946	1 890
WPRO	83 790	5 544	920
Total *Brugia malayi*	286 850	12 490	2 810
Total of all lymphatic filariasis	1 094 060[b]	119 101	42 727

(a) For *Wuchereria bancrofti* infections: only lymphoedema/elephantiasis or hydrocele; for *Brugia malayi* infections: only lymphoedema/elephantiasis; essentially all infected individuals however have damaged lymphatics with abnormal function.
(b) The total number of persons at risk is the number at risk for *Wuchereria bancrofti* infection plus two thirds of the number of persons at risk for *Brugia malayi* infection, since approximately one third of the population at *Brugia malayi* risk lives in areas where *Wuchereria bancrofti* is also present.

- Use of table/cooking salt fortified with very low concentrations of DEC (0.15% to 0.3%) has long been recognized as an effective means to control lymphatic filarial infection in communities where the salt supply can be restricted - regularly, microfilaraemia rates decrease almost to zero and transmission is essentially halted. Recently, the first commercially prepared DEC-salt was manufactured and distributed for sale in India, and DEC-fortified salt is now an available tool with the potential for playing a major role in future filariasis control programmes.

- Control of morbidity (i.e., arresting the progression of elephantiasis and lymphoedema or their reversal) has also been greatly advanced by the observations that intensive local hygiene to an affected limb, with or without the use of topical antibiotic and antifungal agents, appreciably decreases the local inflammatory burden on a patient's compromized lymphatic system and results in dramatic clinical improvement. Preliminary evidence suggests that community-based patient self-help groups work extremely effectively to stimulate and maintain personal compliance with the vigorous hygiene regimens required for this morbidity control, and such a strategy is clearly one that can be exploited worldwide, because nowhere do patients lack the intense desire to rid themselves of their ostracizing deformities.

- Studies on control of the mosquito vectors of lymphatic filariasis, using either the toxin-elaborating *Bacillus sphaericus* or polystyrene beads in breeding sites, have demonstrated unequivocally a decrease in vector numbers and hence a decrease in the transmission of infection. Exactly how and when these vector control tools are cost-effective and useful in large-scale control programmes for lymphatic filariasis are, however, not yet clearly defined.

- Use of new technologies for diagnosis:

  - Lymphoscintigraphy
  - Ultrasound
  - DNA probes for vector infection
  - DNA probes for blood infection

The transfer of the above technologies into country control programmes has begun, e.g. in China, Sri Lanka, India Australia and Papua New Guinea.

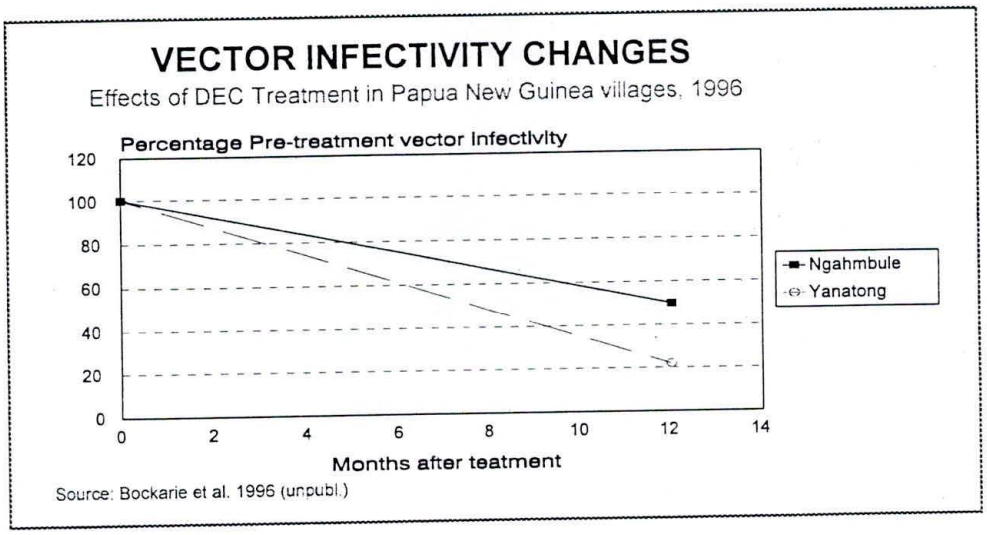


Figure 6

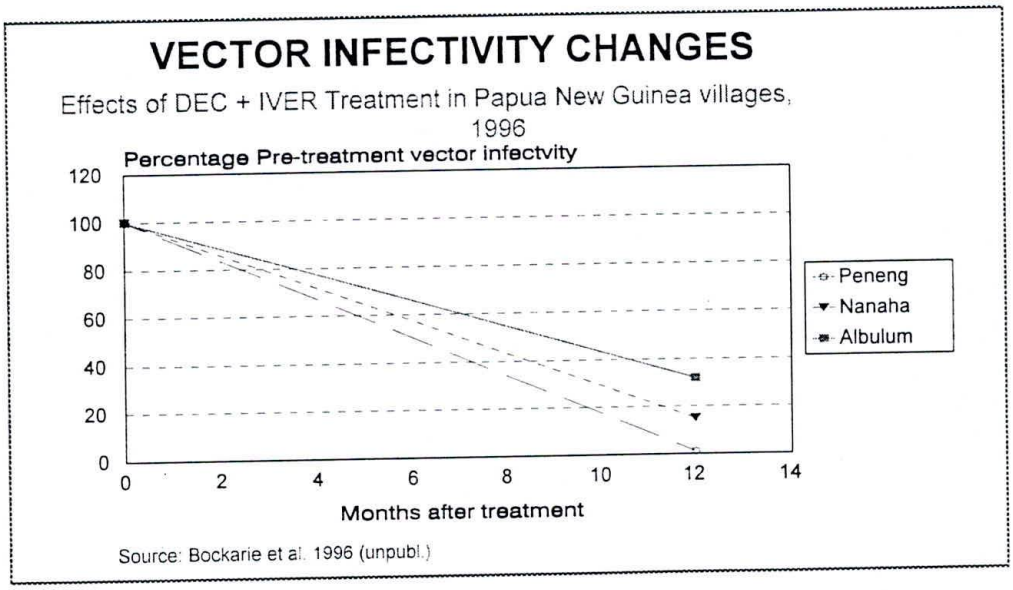


Figure 7

4. The timetable towards elimination

The main landmarks are indicated in Figure 8 (control activities shown as solid bars, research activities as hatched bars) and can be summarized as follows:

1989-1996: Multicentre drug (DEC, ivermectin) clinical trials
1990-1996: Multicentre morbidity control trials
1990-1993: Multicentre vector control trials
1990-1996: Antigen detection assays
1991-1996: DNA probes for detection of infection in mosquitos
1992-1996: Development and production of DEC-fortified salt
1994-1996: Enunciation of the global control strategy
1996-1999: Initiation of control activities by region

5. Future Research Needs

The research priorities that have been identified fall into two main areas, namely epidemiology/operational research and chemotherapy.

Epidemiology/operational research

- Geographical targeting: rapid assessment methods for mapping the distribution of infection/disease, to replace collection of blood at night.

- Design of drug delivery strategies: identification of the optimal target age group; and optimal frequency, duration and coverage of treatment. Mathematical modelling frameworks could be particularly helpful here.

- Logistics of intervention: examination of options for integrating drug delivery into existing systems (e.g. leprosy control PHC clinics) or for incorporating filarial vectors into existing vector control programmes (e.g. for malaria).

- Cost analysis: optimization of the cost-effectiveness of targeting, monitoring and intervention.

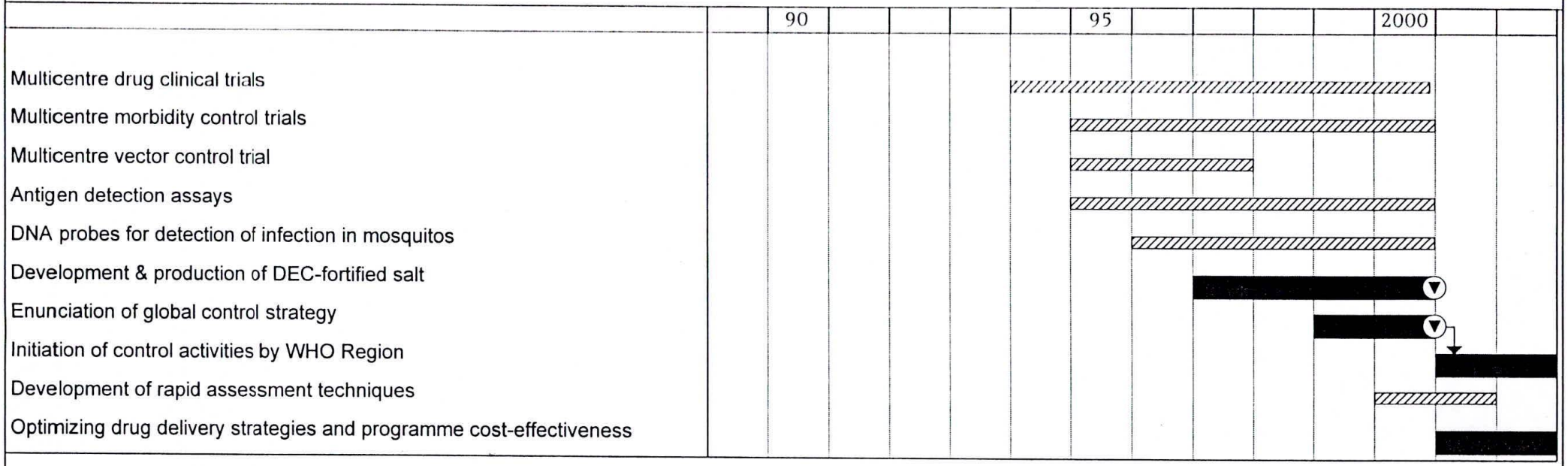
Chemotherapy

- Ivermectin is effective against lymphatic filariasis but is not yet registered for this indication. Diethylcarbamazine is also effective, and is registered, but is contraindicated in onchocerciasis (due to the Mazzotti reaction and ocular pathology). Therefore, there is no drug registered for use for lymphatic filariasis in the onchocerciasis endemic areas of Africa. Yet, paradoxically, the drug currently distributed for onchocerciasis is effective against lymphatic filariasis.

- This argues for the registration of ivermectin for lymphatic filariasis control in the African region. In this respect, negotiations are under way with Merck Sharp and Dohme Pharmaceuticals Co.in the USA.

Figure 8:

Towards the elimination of Lymphatic Filariasis: The Timetable



CHAGAS DISEASE

1. The disease

Chagas disease exists only on the American continent. There are two stages of the human disease: the acute stage, which appears shortly after the infection; and the chronic stage, which may last several years and irreversibly affects the autonomic nervous system of internal organs (heart, oesophagus and colon) and the peripheral nervous system. These incurable lesions develop some 10-20 years after the initial acute phase in one third of those infected, and include *chronic cardiopathy* (in 27% of those infected) as well as *chronic digestive lesions* (in 6%) and *neurological disorders* (in 3%). Patients with severe chronic disease become progressively sick and ultimately die, usually as a result of heart failure.

The disease is caused by a flagellate protozoan parasite, *Trypanosoma cruzi*, which is transmitted to humans by blood-sucking triatomine insects and by blood transfusion.

The risk of infection with Chagas disease is directly related to socio-economic factors: the parasite is transmitted by bugs which live in crevices in the walls of poor-quality houses in rural areas and unplanned urban developments. Rural to urban human migration is a factor which contributes to the spread of the infection by blood transfusion.

2. Disease situation and trends

Data on the prevalence and distribution of Chagas disease have improved in quality during the 1980s as a result of demographically representative cross sectional studies carried out in countries where accurate information is not available. A group of experts met in Brasilia in 1979 and devised standard protocols to carry out countrywide prevalence studies on human *T.cruzi* infection and triatomine house infestation.

These studies were carried out during the 1980s with the collaboration of the ministries of health of Chile, Colombia, Ecuador, Honduras, Nicaragua, Panama, Paraguay, Peru and Uruguay. The accurate information obtained has permitted better planning and evaluation of national control programmes by individual countries.

On the basis of these countrywide surveys it is now estimated that the overall prevalence of human *T.cruzi* infection in the 21 endemic countries is 17 million cases. Some 100 million people, i.e. 25% of all the inhabitants of Latin America, are at risk of contracting the disease.

Incidence is estimated as 1 000 000 new cases per year, and 45 000 deaths annually are due to the cardiac form of the disease.

According to the World Development Report (1993), the number of Disability-adjusted life years (DALYs) lost due to Chagas disease is 2 740 000. From a global perspective, Chagas disease represents the third largest tropical disease burden after malaria and

schistosomiasis. If, according to the UNDP Human Development Report (1994), the estimated average annual per-capita income in Latin America is US$ 2390, the economic loss for the continent due to this disease currently amounts to US$ 6500 million, which is equivalent to 1.3% of the external debt of the whole continent.

Infection of blood in blood banks in selected cities of the continent varies between 3% and 53%, thus showing that the prevalence of *T.cruzi* infected blood is higher than that of hepatitis B/C or HIV infection.

3. Strategy for elimination

3.1 Initiative of the southern cone countries

Since the vector of *T.cruzi*, *Triatoma infestans*, is intradomiciliary in the countries of the Southern Cone (Argentina, Brazil, Bolivia, Chile, Paraguay and Uruguay), sustained implementation of vector control measures can interrupt transmission. In 1991, the ministers of health of Argentina, Bolivia, Brazil, Chile, Paraguay and Uruguay, launched the "Southern Cone Initiative for elimination of transmission of Chagas disease".

Progress towards elimination of vectorial and transfusional transmission of Chagas disease in Uruguay, Chile, Argentina and Brazil has been documented in various scientific publications. [1], [2], [3], [4], [5]

By eliminating the transmission of Chagas disease in the above countries, the incidence of the disease in the whole of Latin America will be reduced by more than 70% (Figures 9 and 10). [6]

Chagas disease is recognized as an important public health problem and is given increasing priority for control, as demonstrated by the above government initiative which is very successful and is paying high dividends. By cutting the transmission of this disease in the countries of the Southern Cone in a short period of time, the incidence of Chagas disease will be reduced by over 70%. From an estimated 1 000 000 cases per year, it will fall in 1999 to less than 300 000 cases a year for the whole of Latin America.

A total of US$ 207 million has been allotted from national sources of the six countries for control operations since the start of the initiative in 1991. With this investment, it is estimated that the economic loss due to Chagas disease will be reduced by US$ 4550 million.

Current data on house desinsectation, coverage of blood banks screening and serology in children and young adults indicate that the vectorial and transfusional transmission of Chagas disease will be interrupted in the following countries in the coming years: Uruguay (1997), Chile (1998), Argentina (1999), Brazil (1999), Bolivia and Paraguay (2003).

3.2 Initiative of the Andean countries and the Central American countries

As the vectors of Chagas disease in these countries are not strictly domiciliated, it is necessary to develop and test new vector control strategies for the local entomological conditions. The initial focus is on blood banks control to prevent transfusional transmission of the disease.

Thus in Colombia, Ecuador, Peru and Venezuela, the target is to adapt existing universal blood screening infrastructure, tentatively by 1996-97. In Venezuela this has already been accomplished.

In Costa Rica, El Salvador, Guatemala, Honduras, Nicaragua and Panama, the target is to adapt existing universal blood screening infrastructures by 1997-98. In Honduras this has already been accomplished.

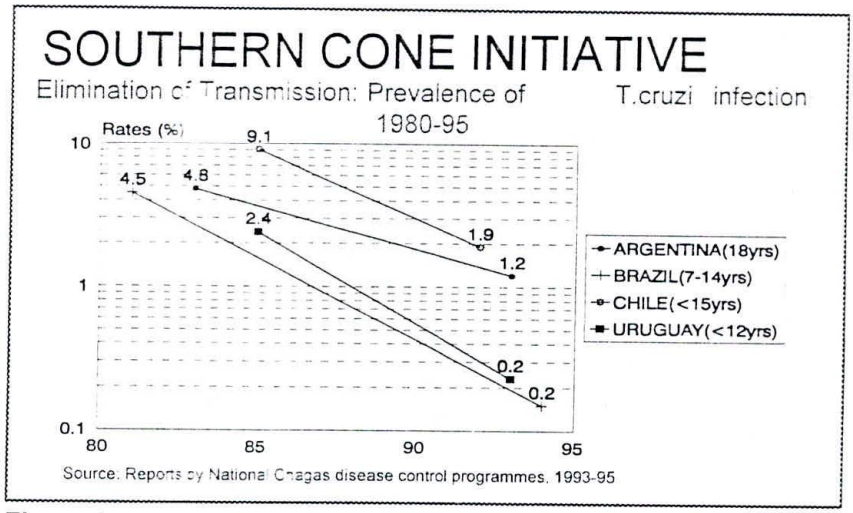


Figure 9

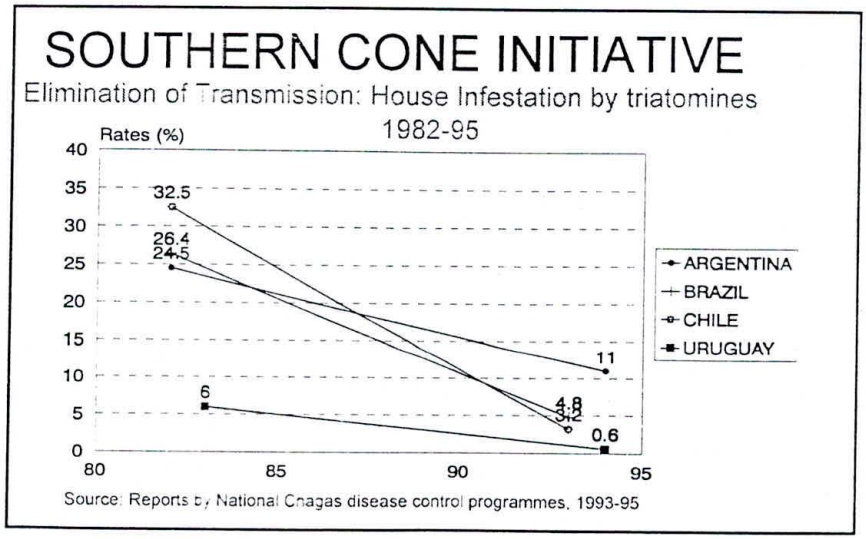


Figure 10

In these countries there are 5-6 million infected individuals and 25 million are at risk of contracting the infection.

Control activities are progressing as scheduled in Bolivia and Paraguay, but at this stage there are no entomological or epidemiological data available to assess the impact of the control programmes in these two countries or to estimate a date for interruption of transmission. These data should be available in 1999, after 4 to 5 years of continued control activities and completion of cross-sectional entomological and serological surveys.

An international independent commission has been appointed to certify the interruption of transmission in the above-mentioned countries.

3.3 Some detailed epidemiological situations

Argentina

In Argentina, transmission of Chagas disease occurs in the zones north of latitude 44°45', which cover about 60% of the country. The main vector is *Triatoma infestans,* which is a domiciliated species.

The strategy employed by the Vector Control Service until 1990 was to use highly trained personnel for the application of insecticide to houses in endemic rural areas.

As a result of field research sponsored by TDR, the control methodology was adjusted and the Vector Control Service decided to change its strategy. Community-based participation and appropriate technology replaced specialized personnel. A sensor device to detect house infestation by the vector, fumigant canisters and portable pumps for use by primary health community agents were developed and tested for efficacy.

Between 1983 and 1991, the average number of houses sprayed was 80 000 a year. Using the new approach, this number rose to 110 000 houses in 1992 and to more than 140 000 in 1994. Besides, there were more than 7500 rural agents working on this programme throughout the country in 1994.

This increase in house spraying resulted in important reductions in the proportion of houses infested by the vector in each province. The reduction ranged from 30.9% in Chaco to 94.3% in La Pampa, with an average reduction of 50.5% in house infestation in the country as a whole.

Figure 11 shows the decreasing prevalence of infection in 18-year-old males by province. There was a reduction of 75% between 1981 and 1993 in this age group.

Figure 12 shows the decrease in number of disease morbidity cases in different age groups compared with the expected figures had no control activities been carried out. In the age group of less than 18 years, an impressive decrease of 81.0% is observed, while in the age group of 18-35 the decrease is 43.6%, and in the group of 35-50 the reduction is 24.3%.

The monetary savings resulting from both direct and indirect costs for the number of human cases prevented by the control programme amount to an impressive figure of US$ 2800 million, or about one-twentieth of the total external debt of Argentina in 1993!

To prevent transfusional transmission of Chagas disease, the screening of *T.cruzi*-infected blood has been compulsory since 1983 and the coverage of screening in blood banks of the country was 100% in 1994. Continued quality control and laboratory performance evaluation, carried out by INDIECH in provincial laboratories, ensures the high sensitivity and specificity needed for the tests used in the screening system.

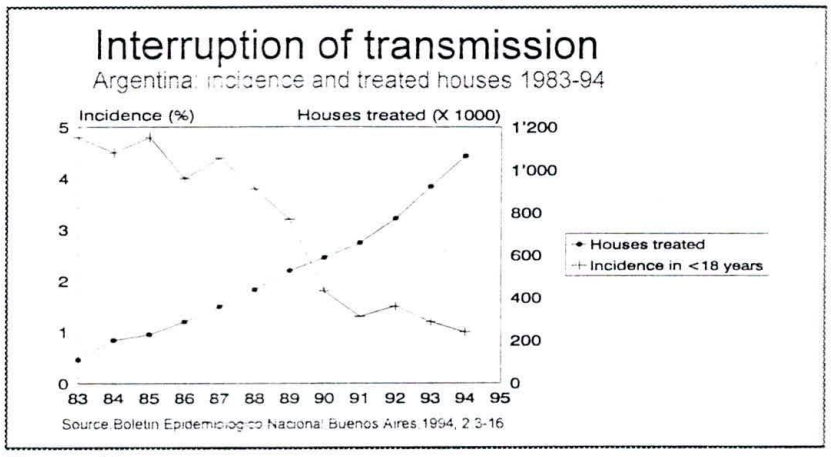


Figure 11

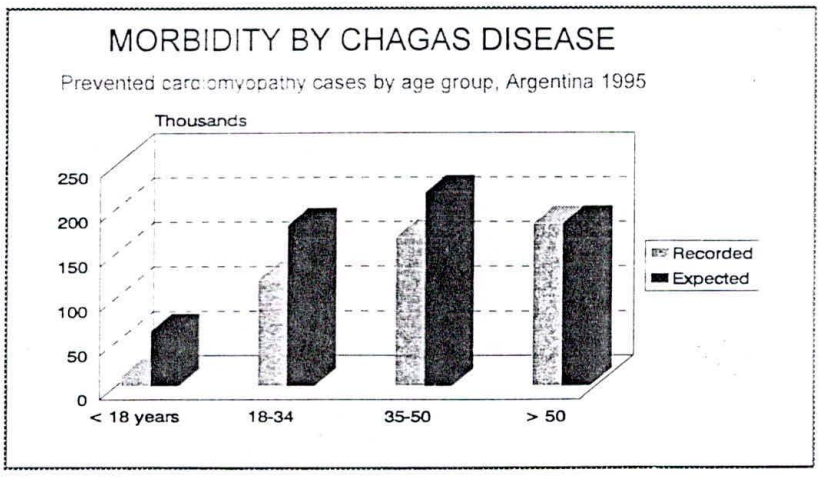


Figure 12

Brazil

In 1970, the endemic area covered over 36% of the country; 2493 districts (over 50%) were infested by *Triatoma infestans*, the main vector of the disease. A total of 49 million persons lived in the endemic zone, with 53% in rural areas. *T. infestans* is the most important species responsible for vectorial transmission of the disease. It is exclusively domestic and shows higher infection with *T. cruzi* than other species of triatomine.

The control programme has produced important results: in the State of Sao Paulo, the vector, *T. infestans,* has been eliminated from human dwellings since 1982 and no new acute cases or seropositive reactions have been detected since 1983 in the group of 1 - 4 years. In the rest of the country, there were 711 municipalities infested by *T.infestans* in the endemic states in 1983, while in 1993 there were only 83 municipalities infested, representing an 89% reduction as shown in Figure 13.

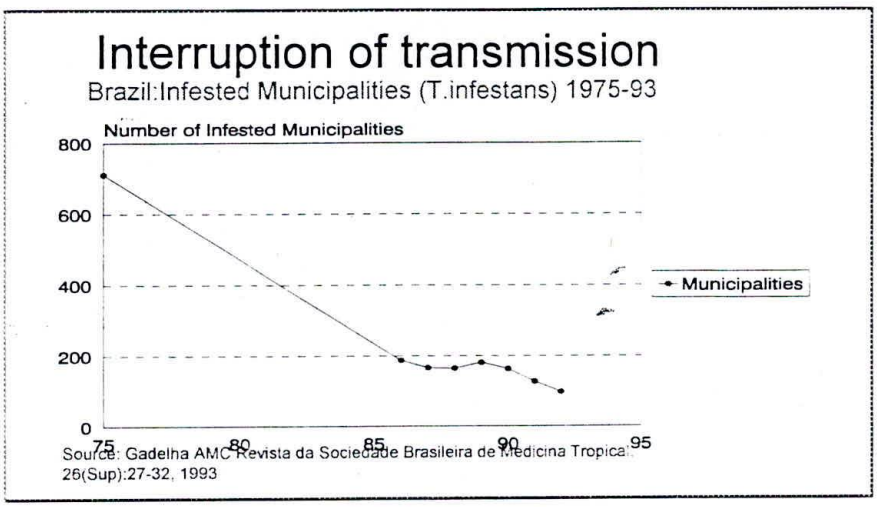


Figure 13

In 1993, only 1800 insects were captured by programme field workers in the whole country, a number that could easily be found in one single house before inception of the control programme. This represents an average of 2.5 insects in every 1000 houses, a house infestation rate far below the minimum threshold necessary to ensure transmission of the parasite.

In 8 of the 11 endemic states, a reduction of house infestation rates ranking from 100% in Mato Grosso to 20% in Goias was observed between 1983 and 1993. For the country as a whole, an average reduction of 71% in house infestation is observed. Focal areas still infested with *T. infestans* remain only in the states of Bahia, Tocantins and Rio Grande do Sul.

Sero-epidemiologic surveys carried out in 1994 in ten endemic states among 7-14 year olds showed that the incidence of infection in this age group is less than 0.5% in nine of the states, indicating a reduction of over 96.0% as compared to 1980. In other words, transmission of the disease by vector has been virtually eliminated (Table 3).

Similar trends are observed in relation to the decreasing proportion of *T.cruzi*-infected blood in blood banks between 1982 and 1991. In 1982, 6.5% of blood was found to be infected in the whole country, whereas in 1991 this proportion was only 1%. In 1995, coverage of screening in blood banks reached 98%.

Current vector control activities are targeted towards the elimination of *T. infestans* in the remaining focal areas of the states of Bahia, Goias and Rio Grande do Sul, and it is estimated that this will be achieved in 1998.

Table 3:
Percentage sero-reactivity (human infection) in 7 - 14 year olds, Brazil 1980 - 1993

STATE	1980 (%)	1993 (%)	Reduction(%)
Bahia	5.4	0.25	96.0
Goias	7.4	0.10	99.0
Maranhao	0.1	0.00	100.0
Mato Grosso	2.8	0.18	94.0
Minas Gerais	8.8	0.06	99.0
Paraiba	3.5	0.36	99.0
Piaui	4.0	0.16	96.0
Rio Grande-Norte	1.8	0.03	98.0
Rio Grande-Sul	2.5	1.52	40.0
TOTAL	**4.2**	**0.15**	**96.5**

Chile

Chile extends from parallel 18° 30' to 52° 30' and has a population of 13 380 000, of whom 82% live in urban conglomerates. Approximately 1 654 000 live in the endemic area from parallel 18° 30' to parallel 34° 35' and hence are at risk of contracting the infection.

In the 1980s, the proportion of infected persons in all age groups in the country was 17.0% and the average house infestation rate was 28.8% . The prevalence of infected subjects among blood donors in 1984 was 3.6% for the whole country.

Two main species of triatomine are responsible for the vectorial transmission of Chagas disease in Chile. *Triatoma infestans*, a domestic insect, is the most important vector.

Vector control operations using insecticides with residual activity and carried out by the national programme between 1982 and 1993 have reduced the house infestation rates by 79% in Arica and by 96% in Iquique, with an average reduction for the whole country of 89.5% (Table 4). The entire country is likely to be free of insect transmission by the end of 1998.

Transmission through blood transfusion is under control, due to compulsory blood screening and 100% coverage in endemic areas.

Table 4
Prevalence of house infestation by triatomines, endemic areas, Chile, 1982 and 1993

Region	Health Services	House infestation rates (%) 1982	1993	Reduction (%)
I	Arica	12.5	2.6	79.2
I	Iquique	18.6	0.7	96.3
II	Antofagasta	45.7	4.1	91.0
III	Copiapo	51.2	8.0	84.4
IV	Coquimbo	49.9	2.4	95.2
V	San Felipe	18.0	2.0	89.0
V	Vina del Mar	34.6	1.6	95.4
VI	O'Higgins	28.1	1.8	79.3
Total		28.8	3.0	89.5

The marked reduction in vectorial transmission is reflected by the drop in the proportion of *T. cruzi*-infected blood donors between 1983 and 1992, as shown in Table 5.

Table 5.
Prevalence of infected blood in blood Banks, Chile, 1982 and 1993

Region	Health Services	*T.cruzi*-positive blood donors (%) 1982	1993
I	Arica	2.5	1.9
I	Iquique	1.6	1.2
II	Antofagasta	3.5	2.5
III	Copiapo	6.5	3.0
IV	Coquimbo	7.0	4.7
V	San Felipe	3.5	0.0
V	Vina del Mar	0.0	0.0
Metropolitan	Santiago	1.5	0.9
Total		3.6	1.3

A countrywide sero-epidemiological study was completed in Chile in 1996. It showed a prevalence rate of 1.9% in the age group of less than 15 years as compared to 9.1% in the same age group in 1983, indicating the advanced degree of control and imminent interruption of vectorial transmission in this country (Figure 14).

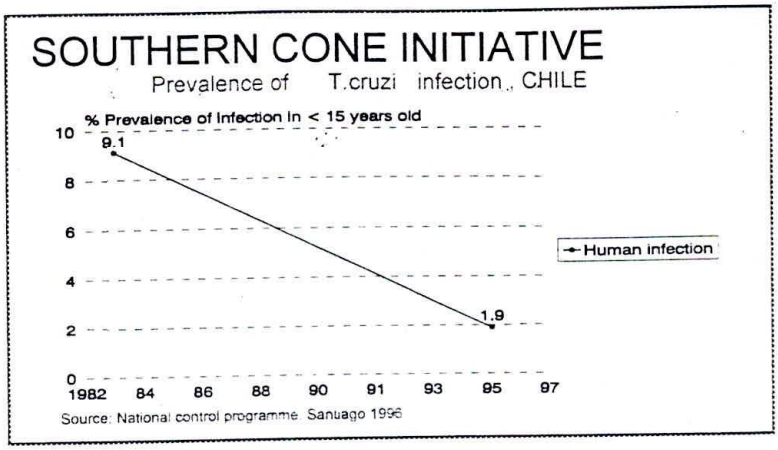


Figure 14

Uruguay

In Uruguay, domiciliary transmission is effected through *Triatoma infestans*. In 1983, this insect infested human dwellings and their annexes in the following departments: Artigas, Rivera, Tacuarembo, Salto, Paysandu, Rio Negro, Soriano, Colonia, Durazno and Cerro Largo, i.e. in 80 % of the territory of Uruguay.

The National Chagas disease control programme, which was reorganized that year, carried out a spraying programme of human domiciles and peri-domiciles with residual activity insecticides. The sustained spraying helped eliminate the infestation by *T. infestans* in Artigas, Colonia, Durazno and Soriano, and markedly decreased the rate of house infestation in the remaining areas (Table 6).

In 1985, a country-wide serological survey to detect human *Trypanosoma cruzi* infection, sponsored by TDR, showed a prevalence rate of 3.4% for the whole population with a prevalence rate of 2.4% for the age group of less than 12 years.

Table 6
House Infestation Rates (%) by department, Uruguay, 1983 - 1992

Department	House Infestation Rate (%)		Reduction (%)
	1983	1992	
ARTIGAS	2.9	0.0	- 100.0
RIVERA	15.3	1.9	- 93.5
TACUAREMBO	22.2	2.3	- 90.0
SALTO	8.8	n.d.	-.-
CERRO LARGO	2.6	0.23	- 99.0
PAYSANDU	0.0	0.0	-.-
RIO NEGRO	1.4	0.06	- 96.0
COLONIA	0.9	0.0	- 100.0
DURAZNO	1.7	0.0	- 100.0
SORIANO	0.7	0.0	- 100.0

A sero-epidemiological survey carried out in 1995 in different rural areas of the endemic departments in children under twelve years old has shown very low (0.2%) or zero infection rates in this age group. This could be interpreted as confirmation of the interruption of vectorial transmission of Chagas disease in the country (Figure 15).

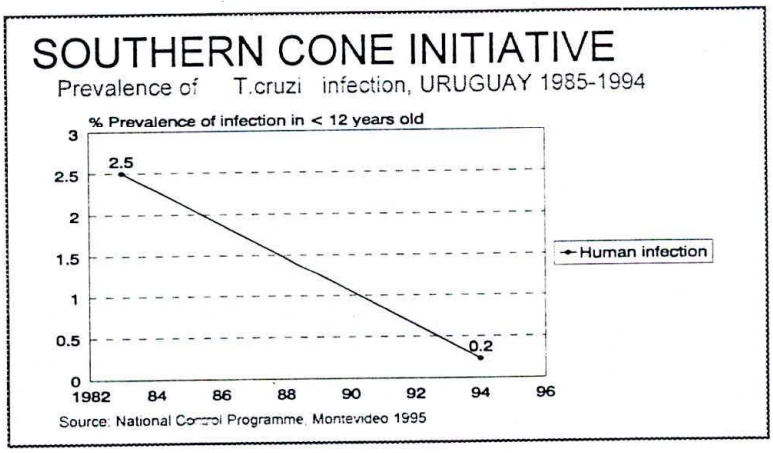


Figure 15

In addition, transmission through blood transfusion is also interrupted due to the very low number of infected donors and the 100% coverage provided by compulsory blood screening in the country.

These data mean that Uruguay is the first Southern Cone country to have accomplished the goals set by the ministries of health of Argentina, Bolivia, Brazil, Chile, Paraguay and Uruguay for the elimination of vectorial and transfusional transmission of Chagas disease since the multicountry programme was launched in Brasilia in June 1991.

4. The timetable towards elimination

The main landmarks are indicated in Figure 16 (control activities shown as solid bars, research activities as hatched bars) and can be summarized as follows:

1980-1985: Prevalence cross-sectional studies on human infection and house infestation in nine countries
1980-1985: Standardization of serological techniques and creation of a continental network of reference laboratories
1984-1990: Follow-up prospective studies on the course of human infection
1987-1989: Cloning of parasite genome and production of defined antigens for improvement of diagnostic techniques
1990: Industrial production of kits for blood banks control
1988-1992: Development of new tools for vector control
1988-1993: Multicountry field studies for evaluation of new vector control tools
1992: Industrial production of paints, canisters and sensor boxes
1992: Initiative of the Southern Cone countries
1993: Initiative of the Andean countries
1993: Initiative of the Central American countries
1995-1998: Evaluation of impact and projection of trends
1998-2000: Certification of interruption of transmission

5. Future Research Needs

Future research priorities have originated from the operational questions detected by the control programme and refer to the evaluation of impact of the control activities, the monitoring of insecticide efficacy to detect possible development of vector resistance, and to the promotion of vector surveillance through the mass media. They include:

* Studies on prevalence, clinical management and cost-effectiveness of interventions for the control of congenital transmission.

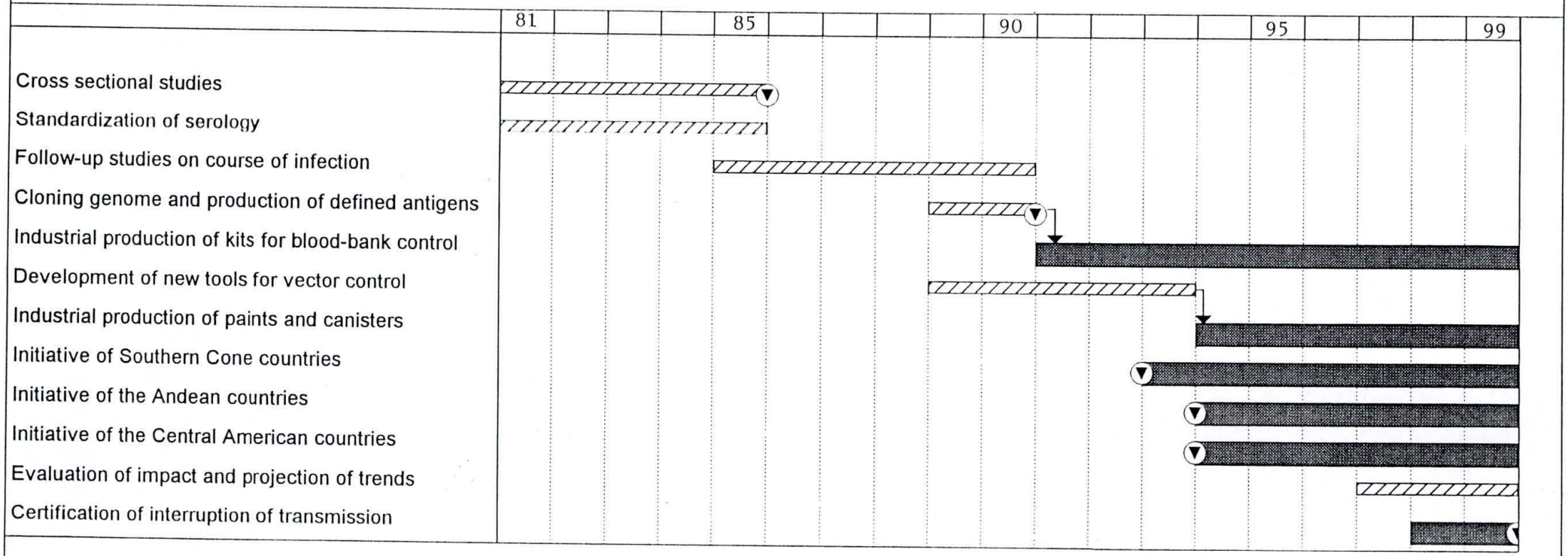
* Monitoring of efficacy of insecticides in the national control programmes.

* Development of techniques for detection of peri-domestic infestation.

* Studies on periodicity of insecticide spraying based on residual density of triatomines.

Figure 16:

Towards the elimination of Chagas Disease: The Timetable



* Evaluation of sensitivity, specificity and costs of improved kits for blood screening using defined antigens and the polymerase chain reaction (PCR) technique.

* Improvement and assessment of methods for disinfection of blood intended for transfusion.

* Modelling and development of indicators to assess elimination of transmission.

* Influence of climatic changes on the populations of vectors.

* Evaluation of the use of the media by the community for promotion of entomological surveillance.

* Evaluation of the efficacy of control and surveillance activities carried out with active community involvement.

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TDR/CTD/FIL/PENANG/94.1

LYMPHATIC FILARIASIS INFECTION & DISEASE:

Control Strategies

Report of a Consultative Meeting
held at the Universiti Sains Malaysia
Penang, Malaysia
(August 1994)

World Health Organization
Division of Control
of Tropical Diseases
(CTD)

UNDP/World Bank/WHO
SPECIAL PROGRAMME FOR
RESEARCH AND TRAINING
IN TROPICAL DISEASES
(TDR)

LYMPHATIC FILARIASIS INFECTION & DISEASE: CONTROL STRATEGIES

EXECUTIVE SUMMARY*

		Page
E-1	**The Problem and the Outlook for its Solution**	i
E-2	**Control of Infection**	i
E-2.1	*Treatment of the human population: New strategies*	i
E-2.2	*Reducing the vector mosquito population*	ii
E-3	**Control of Disease (Morbidity): New Strategies**	ii
E-4	**Monitoring the Success of Control Programmes: New Techniques**	iii
E-5	**Management of Control Programmes**	iii
E-6	**Costs and Cost-Effectiveness of Specific Control Strategies**	iv
E-7	**Operational Research Needs**	iv

*Report of a WHO/CTD/TDR Consultative Meeting held at the Universiti Sains Malaysia, Penang, Malaysia, 22-24 August 1994

E-1 The Problem and the Outlook for its Solution

Lymphatic filariasis persists as a major cause of clinical morbidity and a significant impediment to socioeconomic development in much of Asia, Africa and the Western Pacific as well as in certain regions of the Americas. Indeed, the prevalence of this mosquito-borne infection is increasing worldwide, in large part due to the rapid unplanned urbanization in many endemic areas. It is estimated that *at least* 120 million persons are infected, with essentially all manifesting either the overt findings of lymphoedema, elephantiasis, hydrocoele and recurrent infections or the newly recognized, subclinical abnormalities of lymphatic and renal function.

Despite these disappointing numbers, however, simplified, safe, and cost-effective methods to control and potentially eradicate this infection have recently become available. For example, instead of the older 12-day treatment regimens using diethylcarbamazine (DEC), it is now clear that much simpler treatment strategies employing single yearly doses of DEC or even its daily consumption as an additive to common table/cooking salt are equally effective for control programmes and much easier and less expensive to deliver. Indeed, use of these and other techniques have already caused the elimination of lymphatic filariasis from Japan, Taiwan, South Korea and the Solomon Islands; and China too is in the final stages of an exceptionally effective control programme.

Lymphatic filariasis has recently been identified by the International Task Force for Disease Eradication as one of only six "eradicable" or "potentially eradicable" infectious diseases. This fact, coupled with the recognition that appropriate control efforts can be effectively and inexpensively linked with *pre-existing* national and local public health infrastructures, now provides strong impetus to initiate widespread chemotherapy programmes, with concurrent vector control, where possible, aimed at finally controlling this parasitic infection and the morbidity that it causes in all endemic areas.

E-2 Control of Infection

The two general strategies (which need not be mutually exclusive) to reduce transmission of filarial infection are:
(1) treating the human host to decrease microfilaraemia and (2) decreasing human-vector contact, usually by reducing the density of the mosquito vectors. *Optimal* control strategies will necessarily differ for different endemic countries, since each must take into account the particulars of the local host-vector combination, existing health care infrastructure, and cultural practices.

E-2.1 *Treatment of the human population: New strategies*

'Mass distribution' programmes should completely replace those based on a 'selective treatment' strategy (i.e., detection of microfilaraemics who are then treated 'selectively'). The recommended regimens for mass treatment would be <u>either</u> of the following:

(a) <u>DEC-fortified salt</u> (0.2 - 0.4% w/w). Use of DEC-fortified salt for a period of 9-12 months has been shown to be simple, cheap and effective in dramatically reducing or eliminating lymphatic filariasis. It is generally well tolerated, safely used in pregnancy and can be incorporated into iodized salt. It can be utilized in most control programmes but cannot yet be recommended in areas where there is coexisting onchocerciasis or loiasis.

(b) <u>Single annual or semi-annual mass administration of DEC</u> (6 mg/kg body weight). This regimen appears to be as effective as the older 'standard' 12-day course of DEC, has fewer adverse effects, and results in enhanced population compliance and decreased delivery costs. Adverse

reactions, though greater than those seen with DEC-fortified salt, are well tolerated, but this regimen definitely should not be used in areas where onchocerciasis or loiasis coexists.

If, as anticipated, ivermectin subsequently becomes registered for use in lymphatic filariasis, two additional chemotherapy tools would become available:

- Ivermectin 400 µg/kg given once yearly;
- Ivermectin 400 µg/kg + DEC 6 mg/kg given once yearly.

The single-dose ivermectin regimen appears equivalent to single-dose DEC regimens in efficacy, safety and tolerance, and, in addition, it has the advantage that *it can be used safely in areas where onchocerciasis or loiasis may also coexist.* The combination regimen, however, appears to be superior to either drug alone for long-term reduction of microfilaria density and prevalence, and it would almost certainly become the 'annual-dose treatment' of choice (except in *O. volvulus* and *L. loa* endemic areas) if ivermectin became appropriately registered.

The exact duration for which these various treatment strategies need to be sustained has not been established, though current estimates suggest 5-10 years for yearly-dose strategies and 9-12 months for DEC-salt.

E-2.2 *Reducing the vector mosquito population*

Vector control has played an important supporting role for filariasis control in certain local programmes, and reduction of vector density can be an important contributor to achieving long-term sustainability of transmission interruption. However, filariasis control programmes should not be based on vector reduction alone. Rather, vector control should be implemented whenever feasible as a complementary tool to filariasis control programmes based primarily on drug administration.

Certain technologies are now emerging that should improve vector control capabilities, though all still require large-scale validation and assessment of their impact on filarial transmission as well as the subsequent clinical effect in the human population. These measures include the following:

- biocides: especially *Bacillus sphaericus* (a toxin-producing bacterium) to control *Culex quinquefasciatus*;
- polystyrene beads: to limit breeding of culicine vectors in specific urban situations with enclosed (e.g. latrines, cess pits) breeding sites;
- insecticide-impregnated bed nets and curtains: to limit host-vector contact;
- indoor spraying of long-lasting, residually active pyrethroids: especially for the adult-stage of *Culex* and *Mansonia* mosquitoes;
- community participation in integrated vector management: difficult to sustain in the urban setting, but successfully used in controlling rural *Mansonia.*

E-3 **Control of Disease (Morbidity): New Strategies**

Dramatic advances in our understanding of the pathogenesis of lymphatic filariasis, especially recognizing the importance of local microbial superinfection in exacerbating lymphatic pathology and recognizing the appreciable subclinical pathology in the lymphatics of 'asymptomatic' microfilaraemic individuals, have led to specific, on-going clinical trials that appear likely to yield the following treatment recommendations:

(a) for adenolymphangitis (ADL): treatment (and possibly prophylaxis) with antibiotics, since the majority of these acute episodes appear to be of bacterial aetiology;

(b) for lymphoedema/elephantiasis: rigorous local hygiene with/without local antibiotic and anti-fungal agents to prevent ADL episodes and permit the reversal of existing lymphoedema;

(c) for asymptomatic microfilaraemia: early treatment to prevent further lymphatic and renal damage; in the absence of specific data, the long-standing "standard" courses of DEC (6 mg/kg/day for 12 days [*W. bancrofti*] or for 6 days [*B. malayi*]) remain appropriate.

For other clinical syndromes associated with lymphatic filariasis (e.g. tropical pulmonary eosinophilia, chyluria, etc.) there is no new information available to change the current recommendations for their extended treatment with DEC.

E-4 Monitoring the Success of Control Programmes: New Techniques

Surveillance of potential transmission or established human infection in an unsurveyed population is necessary to determine where control efforts should be initiated, how effective they are, and when they may be discontinued. There is a major need to replace night blood surveys as the primary method for determining the level of endemicity in a community. Evaluation of antigenaemia rates in daytime, finger-prick blood specimens from children or other selected cohorts of the population has proven to be a workable alternative to night blood surveys, and analysis of infection rates in mosquito vectors with entomologic or DNA-based techniques shows equal promise. 'Rapid assessment' techniques, such as review of existing health reports and hospital records or clinical examination of adult males for hydrocoeles to assess the prevalence of infection, are also being developed as 'tools' for identifying endemic communities in previously unsurveyed areas.

Mathematical models have provided increasingly powerful tools for analysis, prediction and evaluation of control strategies in other parasitic infections, and such models should be particularly valuable for lymphatic filariasis because of the complexity of the interactions among the vector, human and parasite populations and because of the long time-scales involved in filarial infection and disease. Models that can serve as cost-effective tools for studying the population dynamics of transmission and for assessing the consequences of control interventions and their relative cost-effectiveness are under development.

E-5 Management of Control Programmes

The new control strategies based on anti-filarial chemotherapy do not require complex management structures.

The strategy requiring the least management input is DEC-fortified salt distribution. While specific inputs are required for production, advocacy and community empowerment, the distribution itself can use existing (health or non-health) delivery systems. Additionally, this approach can take advantage of inherent cost recovery through consumer purchasing and, thus, might require no sustained financial input.

Single-dose, annual or semi-annual mass treatment also removes the need for the complex management structures necessary for detecting individual cases, and it provides the opportunity for integration into existing Primary Health Care systems for delivery implementation.

Morbidity control, too, can be effected with only minimal management input other than training the community in the importance of local hygiene to affected limbs or organizing self-help support groups among patients and their families.

While vector control generally requires a separate management structure, it often provides the opportunity for an increased level of community participation.

Opportunities also exist for integration with existing vector-based control programmes for other diseases (e.g., malaria).

E-6 Costs and Cost-Effectiveness of Specific Control Strategies

The affordability of filariasis control is particularly important because of the relatively low priority often accorded it by health planners.

DEC-fortified salt requires the least resource input since it relies on existing community purchasing practices. There is, however, some increase in purchasing cost to the consumer, with recent experience in India suggesting that high quality, re-crystallized DEC fortification will add US $0.80 per year er adult to the average bill for purchase of salt.

The replacement of active case detection and courses of multi-dose treatment of the population by use of single-dose mass treatment provides the opportunity for *increasing coverage without additional cost* through reallocation of existing resources.

E-7 Operational Research Needs

Though *currently available information is sufficient for immediate initiation of large-scale filariasis control or elimination programmes*, there are still certain issues which, if resolved, would enhance rogramme design and implementation; specifically, these are:

(a) more precise estimates of the global, regional and national burden of illness caused by lymphatic filariasis, and rapid assessment techniques to help make these estimates;

(b) a control strategy that can be used safely and effectively in areas where bancroftian filariasis might coexist with onchocerciasis or loiasis (i.e., one based on ivermectin delivery or use of DEC-fortified salt, if proven safe for patients with onchocerciasis and loiasis);

(c) detailed, comparative, cost-effectiveness analyses (CEA):

- between mass-delivery and fortified-salt approaches to controlling lymphatic filariasis (including how the delivery of anti-filarial medication can be integrated with other health and non-health delivery systems);
- for vector control - not as a stand-alone option for filariasis control, but as a potential adjunct to chemotherapy-based strategies;
- of surveillance and rapid assessment procedures under actual conditions of implementation - in particular, comparing DNA-based techniques and mosquito dissection for detection of vector infectivity, and comparing blood antigenaemia detection with microfilarial detection by microscopy and clinical or recall techniques for determining prevalence of infection in a community;

(d) identification and quantification of the economic and social costs of filarial disease, including costs both to individuals and to the national health care budget for management of elephantiasis, hydrocoele and adenolymphangitis;

(e) further definition of the clinical consequences of 'asymptomatic' microfilaraemia, with its newly-recognized accompanying abnormalities of lymphatic and renal function, and an estimation of their contribution to the social and economic burden of filarial disease;

(f) evaluation of the personal and social psychology of compliance with annual mass drug treatment or long-term use of fortified-salt, and of decision making in the personal-choice use of fortified salt;

(g) development of predictive models which provide the kinds of information required by managers for planning and monitoring control programmes;

(h) uniform surveillance, clinical assessment and monitoring techniques so that *types* of site-specific control strategies can be defined, as well as those areas where total eradication of infection will be most readily achieved.

LYMPHATIC FILARIASIS INFECTION & DISEASE:

CONTROL STRATEGIES

Report of a WHO/CTD/TDR Consultative Meeting held at the Universiti Sains Malaysia, Penang, Malaysia, 22-24 August 1994

		Page
1.	**Global Prevalence, Distribution and Disease Burden of Lymphatic Filariasis**	1
1.1	Prevalence	1
1.2	Geographical Distribution	2
1.3	Patterns of Infection and Disease	2
1.4	The Global Burden of Disease	3
1.4.1	*Disability*	3
1.4.2	*Economic*	4
1.4.3	*Research priorities*	4
2.	**Current National Control Strategies**	4
3.	**New Research Findings Giving Rise to New Control Strategies**	7
3.1	Infection Control (Chemotherapy)	7
3.1.1.	*Drug regimens available for filariasis control - Comparative efficacy*	7
3.1.2	*Adverse reactions*	9
3.1.3	*Macrofilaricidal activities of DEC and ivermectin*	9
3.2	Morbidity control	10
3.2.1	*Adenolymphangitis and lymphoedema/elephantiasis*	10

Page

3.2.2 *"Asymptomatic" microfilaraemia* 10

3.3 Vector control 11

3.4 Programme development/oversight 12

3.4.1 *New tools for diagnosis and epidemiological assessment and monitoring* 12

3.4.2. *Predictive models* 14

3.4.3 *Social and economic issues in control programmes* 14

3.4.3.1 Socioeconomic findings 14

3.4.3.2 Community participation 14

4. **Conclusion** 15

4.1 Recommended Control Strategies 15

4.2 Operational Research Needs 15

Tables 17

References 23

List of participants 27

STRATEGIES FOR CONTROL OF LYMPHATIC FILARIASIS INFECTION & DISEASE

A meeting was held at the Universiti Sains Malaysia, in Penang, Malaysia from 22-24 August 1994 (list of participants appended). The purposes of this meeting were to define as precisely as possible the current understanding of the epidemiology and global impact of lymphatic filariasis; to review current control efforts in selected endemic countries; to identify the dramatic recent advances in clinical understanding, therapeutic options and assessment techniques of potential value to control programmes; and then to determine specific control strategies that can be recommended for immediate implementation in endemic countries.

1. Global Prevalence, Distribution and Disease Burden of Lymphatic Filariasis

1.1 Prevalence: Information about distribution and prevalence is an obvious prerequisite for any meaningful discussion of the public health importance of a disease. For lymphatic filariasis, caused by *Wuchereria bancrofti, Brugia malayi* and *B. timori* parasites, estimates of global prevalence have been made previously by WHO (1,2), with the latest published figures (2) indicating infection of some 72.8 million people with *W. bancrofti* and 5.8 million with *B. malayi* or *B. timori*. These figures are based largely on reports by member states to the WHO Expert Committee on Filariasis, except for the countries of Sub-Saharan Africa where most estimates were derived from much earlier surveys (3). Although the WHO estimates have proved important in indicating the numerical scale of the problem, they provide less information relevant to the public health importance of these infections since separate estimates of disease are not available. A more recent detailed assessment of available information has attempted to correct for age, gender, and disease-specific biases in the earlier figures, and it estimates that approximately 119.1 million individuals are now infected with lymphatic filariasis worldwide, 106.2 million having bancroftian filariasis and 12.9 million having brugian filariasis (table 1; refs. 4,5). The number with *overt* physical disabilities from their infections is approximately 43 million, with bancroftian filariasis accounting for almost all (40 million) of these cases.

These recent estimates (4,5) were based on all published and unpublished quantitative data from the last 20 years that was retrievable from the open literature, from the WHO regional offices and from individual countries. 'Corrections' to this broad dataset were undertaken in two steps. The first step consisted of estimating age-specific rates of infection and disease (hydrocoele in males and lymphoedema for both sexes) in each study, with data recorded to the nearest age-class when available. Age-specific rates for studies that provided only crude overall infection and disease rates were derived as follows: first, age-specific rates from all studies in a region providing such information were combined to produce standard regional age-prevalence curves; then, these curves were applied to the 'crude overall rates' given in studies in that region to derive the corresponding age-specific infection and disease rates for the study community. Similarly, sex ratios of infection and disease prevalence, and, in the case of males, the ratio of hydrocele to lymphoedema were calculated from studies providing the required data in each region and then used to generate gender- and disease-specific estimates in those instances when only composite overall prevalences were reported.

In the second 'corrections' step the direct and derived age-specific rates from these studies were then combined to obtain national and regional burdens. First, age-estimates from each study in a particular country were averaged to obtain the corresponding national gender-specific, age-prevalence curves. Then, with available demographic data, these curves were converted to numbers of individuals afflicted in a particular country by sex and age-class. Wherever possible, WHO estimates of the size of the national populations living in

endemic regions (derived from information reported by Member States) were used in these calculations. The exception is China, where some recent estimates (6) have ignored the populations of provinces having infection prevalences below 1%. For the present estimates, however, populations of all provinces where infection is present have been considered as the exposed, endemic population. For global estimates, the total number of country or regional cases were summed, and average prevalence (expressed in percentages) calculated using the total endemic population as the denominator (Tables 1a,1b).

The new estimate of the world burden of 119.1 million cases of lymphatic filariasis is higher than the 1992 WHO estimate of 78.6 million but, given the difference in the methods of estimation, not very remarkably so. Indeed, the similarity encourages the belief that the true burden lies in the vicinity of these figures, and probably closer to the more recent estimate, since most available figures tend (for technical reasons) to underestimate both microfilarial and disease prevalence; also 'cryptic' infections (i.e., not manifested by either overt lymphatic pathology or microfilaraemia are not taken into consideration at all in these calculations because of the difficulty in diagnosing them objectively and with certainty).

1.2 Geographical Distribution

The 1992 report of the WHO Expert Committee on Filariasis (2) indicates that brugian infection is endemic in 8 countries in Asia, while *W. bancrofti* occurs in 7 countries in the Americas, 4 in the Eastern-Mediterranean region, 8 in South-East Asia and 8 in the Western-Pacific region; an additional 38 countries lie within the *W. bancrofti* endemic areas of Sub-Saharan Africa. The prevalence estimates in Table 1a indicate that India, with 45.5 million cases and Sub-Saharan Africa, with 40 million cases, have very similar burdens of *W. bancrofti* infection. Individually these regions account for about 38% and 34% respectively of the total world burden, a conclusion contrasting with that from previous estimates which suggested that the majority of filarial infection and disease was confined to India. In fact, in terms of prevalence, (Table 1a), slightly higher infection and disease rates are observed for the Sub-Saharan African region than for India. Given the public health significance of this finding for Africa, it is clear that there is an urgent need for more precise information on infection prevalence in this region, including information to quantify current at-risk population sizes or, at least, to identify all endemic countries. The region with the third highest number of cases (14.5 million) and prevalence (1.83%) of bancroftian filariasis is Asia (excluding China and India) and the Pacific islands, followed by China with a total burden of 5.46 million cases. Though focally important, only low burdens of infection and disease are observed for 'Latin-America and the Caribbean' and for the 'Middle Eastern Crescent'.

The regional estimates for brugian filariasis (Table 1b) indicate that China (32%) and India (20%) account for half of the global burden, with the South-East Asian countries of Indonesia, Thailand, Malaysia, Philippines, Viet Nam and South Korea accounting for the rest.

1.3 Patterns of infection and Diseases

The global age-specific estimates seen in Tables 2a,2b indicate the markedly age-dependent nature of lymphatic filarial infection and disease. Numerically, the largest number of cases (microfilaraemia and disease) for both parasite genera occurs in the 15-44 year age-group, but the prevalences of microfilaraemia and disease are highest in the 45-60+ age-group. Gender-specific estimates indicate a male bias for microfilaraemia, apparently 10% more cases in bancroftian filariasis and 25% more cases in brugian filariasis. Chronic disease due to bancroftian filariasis also appears to be more prevalent among males, largely because of the large number of hydrocoele cases (26.79 million). When the numbers of lymphoedema cases are compared, the bias actually appears to be in the opposite direction, with significantly greater (about 18% more) disease among females (7.81 million) than males (5.36 million cases). For brugian filariasis both microfilaraemia (males: 6.52 million

cases, females: 3.84 million cases) and lymphoedema (males: 1.8 million cases, females: 1 million cases) appear to be higher among males.

There is less quantitative information on acute disease manifestations, but these appear to be less obviously age dependent than do chronic manifestations (7), although the frequency of adenolymphangitis (ADL) episodes in individuals does appear to increase with age and the severity of chronic disease manifestations (8). The frequency of acute episodes is believed to be related to the progression to chronic disease, but it is not known whether the episodes are determined by intercurrent microbial infection, immunological mechanisms or exposure to infective mosquito bites (8).

1.4 The Global Burden of Disease

1.4.1 *Disability*

The 1993 World Bank Development Report (WDR) uses Disability Adjusted Life Years (DALYs) as a standardized metric for comparing the public health impact of different diseases and conditions (9). The global burden of lymphatic filariasis was estimated at 850,000 DALYs lost, which represents only 0.23% of the global burden of parasitic and infectious disease. If this current value is seen as a serious underestimate, then it may equally be appreciated as illustrating the current lack of appropriate information and the need for more quantitative data from which new estimates can be derived. Such data requirements fall into two categories: (i) estimation of disease incidence, and (ii) estimation of the disability level associated with each disease category.

Current estimates of disease incidence, necessarily through lack of data, focus on the more gross chronic manifestations. How justified this limited focus may be is debatable, but what is certainly true is that such a narrow definition significantly reduces the estimate of disease incidence, not only because acute disease is likely to be many times more prevalent than chronic (8), but also because acute disease occurs in the younger age classes which are positively weighted in the calculation of DALYs and which constitute the majority of the population of endemic countries. This age-effect is likely to be particularly important in Africa where almost no information on incidence of acute disease exists.

Another important factor in estimating incidence of disease is gender. The WDR estimates (9) suggest that the burden in women is approximately half that in men (presumably reflecting the differential occurrence of hydrocoele). Since acute disease appears similarly prevalent in both sexes (7), there is the likelihood that much disease in women has been overlooked.

The *disability* associated with chronic disease is largely unquantified but is currently under investigation in a series of WHO-sponsored studies. Anecdotal evidence suggests (10) that the impact of disability may be both economic (e.g. lost employment opportunities) and social/psychosocial (e.g. stigmatisation and reclusion). Studies in a wide range of endemic countries will be required to define such impacts since social and economic consequences are likely to be highly culture-specific.

The disability associated with acute disease is even less well understood and has largely been ignored. ADL appears to occur from adolescence onwards as well as in the young adult age-groups where chronic disease manifestations are rare. A study of chronic-disease patients in India (8) indicates that the duration of each ADL episode (mean of 4.1 days) is largely independent of age but that the frequency (mean of 4.2 episodes per year) increases with both age and disease chronicity. The study indicates that while some individuals may suffer 'filarial fever' much more often, the average for middle-aged lymphoedema patients is 30 days a year; and the figures suggest significant additional disability for those with pre-existing chronic disease. While social and economic consequences of acute episodes are also largely undetermined, the existence of specific local names (e.g. *Yanakkalu jwara* in Tamil, and *homa ya mitoki* in Kiswahili) suggests that the condition is sufficiently obtrusive to be commonly recognised.

Calculation of the disability associated with acute disease would likely have an appreciable effect on estimates of the disease burden of lymphatic filariasis. Indeed, not only might the disability be additive for those with chronic disease, but it might also appear as a new source of disability prominent in the younger age classes which, as stated before, are weighted more heavily in the estimate of DALYs and which make up a larger proportion of the population of developing countries. Thus, it is clear that the accurate estimation of the global health burden of lymphatic filariasis is crucially dependent on obtaining a more detailed epidemiological understanding of acute disease. Furthermore, the newly recognized existence of very substantial amounts of 'subclinical' pathology in essentially all microfilaraemic individuals .1-13) argues that estimates of the global health burden of filariasis must find ways to include the health consequences of this type of pathology as well.

1.4.2 *Economic*

Establishing an economic case for the control of lymphatic filariasis will certainly assist the promotion of filariasis control, as review of this complex area has recently indicated (10). While both indirect costs and direct costs to the household and to the health care system appear large, they are as yet unquantified. WHO is currently sponsoring studies in this area to complement the efforts of others to estimate global disease burden.

1.4.3 *Research priorities*

For the emergent strategies for filariasis control to be adopted by endemic countries, the best case (health, social, economic) for controlling this disease needs to be made. The following areas are identified as priorities for providing the necessary data:

(a) adoption of standardized methods (including rapid assessment techniques) for collecting, presenting and interpreting epidemiological data on infection and disease;

(b) estimation of the incidence of infection and disease in Africa;

(c) definition of the epidemiology of acute disease;

(d) assessment of disease in women;

(e) estimation of disability attributable to chronic 'subclinical' disease;

(f) estimation of the economic impact of the infection and disease.

(g) assessment of the psychosocial impact of the infection and disease.

Such information will permit more accurate estimations of the global economic and health burden attributable to lymphatic filariasis; without it, "lymphatic filariasis will continue to struggle to compete with more prominent diseases for scarce health resources..." (10).

2. Current National Control Strategies of Selected Countries

Official representatives or other knowledgeable individuals from 11 countries endemic for lymphatic filariasis described the policies for filariasis control in these countries. Specific problems, successes and current directions of these programmes were reviewed as follows (see also Table 3).

China (14): Efforts to control lymphatic filariasis have been intensive and concerted since the first National Programme began in 1956, and the results have been remarkable. From a prevalence of 31 million cases in 1956, diligent use of DEC-fortified salt and mass treatment programmes with standard 2-week courses of DEC have brought the number of filariasis cases to an estimated 1.58 million. Indeed, in almost all of the originally endemic provinces prevalence is now less than 1%. Current efforts at controlling filariasis are focused on the use of DEC-fortified salt for periods of 6-9 months in communities where filariasis still remains.

Egypt (15): Despite early success at controlling bancroftian filariasis through DEC

delivery and mosquito/environmental control efforts, after the control programme was relaxed in 1965 the problem of bancroftian filariasis began to return. Currently the peri-Cairo, rural and semi-urban area of the Nile delta have foci where the prevalence of bancroftian filariasis is greater than 20%. A division of the Ministry of Health responsible for filariasis, malaria and leishmaniasis control oversees filariasis control in Egypt, and this control is based primarily on identifying microfilaraemic individuals in night-blood surveys and treating them with standard courses of DEC. Additionally, limited mosquito control efforts relying on insecticides, *Bacillus thuringiensis* and insecticide-impregnated bednets are also utilized in some areas.

French Polynesia (16): During the 1950s lymphatic filariasis was a public health priority in French Polynesia, as 30% of the population was microfilaraemic and 10% suffered from lymphoedema. Mass chemotherapy with various regimens of DEC was initiated, the schedule ultimately becoming 6 mg/kg delivered in single doses twice yearly to the entire population. Prevalence levels fell dramatically (to 2% by 1982), but after the control programme was replaced in 1982 by a passive system of DEC availability and health education, infection rates returned progressively towards pre-control levels. In 1993, the Ministry of Public Health re-initiated the mass chemotherapy programme, with DEC (3 mg/kg) being given every 6 months.

India (17): The National Filaria Control Programme (NFCP) is a division of the National Malaria Eradication Programme in the Ministry of Health. The NFCP budget is approximately 30 million rupees per year (approximately US $1,000,000), and primary control strategies include larviciding and environmental control measures for mosquito reduction in urban areas, as well as screening urban populations by night blood surveys and treating with DEC (6 mg/kg/day x 12 days) those found either to be microfilaraemic or to have lymphoedema. Almost 4 million blood films were reported on during 1992. A small number of programmes using DEC-fortified cooking/table salt to control bancroftian filariasis are also currently underway. Though 75% of the population at risk lives in rural areas, all filariasis control efforts are confined to urban areas. No assessment of the impact of these control efforts is routinely carried out.

Indonesia (18): Indonesia is the only country with all three species of lymphatic filarial parasites, with both periodic and sub-periodic *B. malayi* (feline and primate reservoir hosts), and with transmission by five different mosquito genera and a plethora of individual species. A National Filariasis Control Programme was established in the early 1970s, and much pioneering work on 'spaced' low-dose DEC, with appreciable community participation and involvement of the primary health care system, was carried out subsequently (19). The current strategy is based on mass distribution of low-dose DEC (100 mg for an adult, 50 mg for a child less than 10 years old) given weekly for 40 weeks by primary health care workers in endemic communities where mf prevalence is greater than 1%. This strategy has proven very successful in bringing down both microfilarial rates and the incidence of lymphoedema when they have been monitored. Efforts to identify additional villages in which this strategy can be initiated are currently in progress. It is felt that the control of lymphatic filariasis is possible using DEC as the mainstay of the control strategy.

Malaysia (20): A formal and systematic Filariasis Control Programme for Malaysia was started in the early 1960s, with current control activities incorporated under the Vector-Borne Diseases Control Programme of the Ministry of Health. With an annual incidence of 3-5 cases of microfilaraemia per 100,000 population, 17 control teams are dispersed throughout the endemic areas to carry out geographical reconnaissance, night blood surveys, treatment of cases with DEC for 6 days, follow-up evaluation and health education. These activities are concentrated in the areas of the country with the highest endemicity levels (Kedah, Perak, Kelantan, Terengganu, Pahang and Sabah).

Papua New Guinea (21): Though no formal national surveys have been carried out, areas

of heavy endemicity with very high rates of both microfilaraemia (up to 98%) and lymphatic pathology have been documented. Similarly, no national control programme yet exists for controlling lymphatic filariasis, but Ministry of Health-approved mass treatment campaigns with DEC have been undertaken both in Western Province and in the East Sepik region with external (Australia, WHO) funding and assistance.

Philippines (22): The Filariasis Control Programme is currently part of the Communicable Disease Control Service in the Philippines. Distribution of lymphatic filariasis (both bancroftian and brugian) is widespread, and the true prevalence and distribution of these infections are not completely defined. A survey in the 1960s indicated that 42 of 56 surveyed provinces were endemic for lymphatic filariasis. Control activities (treating diagnosed cases with standard DEC regimens) currently operate at a low level because of the meagre financial and personnel resources available.

Sri Lanka (23): No new cases of brugian filariasis have been reported after 1968. It is currently estimated that there are 7.5 million persons at risk of *W. bancrofti* infection along the coastal areas of the country. Until 1987, approximately 1 million blood films per year were examined for microfilariae; more recently about 2/3 of that number are examined yearly. Although thought to be an underestimate (because of inadequate sample size), the prevalence of microfilaraemic persons in these areas was 0.36% in 1993. All microfilaraemic individuals are given DEC (150 mg twice daily for 2 weeks, with an additional course of treatment one month later). The programme is administered through a governmental Anti-Filariasis Campaign (AFC) established in 1947. A major part of the control activities has now become the responsibility of the Ministries of Health of the newly constituted Provincial Councils. The national AFC is responsible for coordinating this activity and also effecting control measures outside of the 'classical' endemic areas.

Tanzania (24): Bancroftian filariasis with significant clinical disease is endemic in coastal Tanzania and in areas near Lake Victoria and Lake Malawi. At present, there is no national programme or implemented policy for control of either morbidity or transmission; rather, there is an 'indirect' programme whereby externally supported vector control programmes to reduce malaria morbidity also help to control filariasis by using both sprayed insecticides and pyrethroid impregnated bednets. Polystyrene beads and *Bacillus sphaericus* are also used for vector control of *Culex quinquefasciatus*. These limited control efforts exist primarily in the urban areas of Dar es Salaam and Tanga, and there are no broadly applied control efforts in rural areas of the country. The political will is present, as well as the necessary expertise, but funding for filariasis control is not available except for projects sponsored by outside agencies.

Thailand (25): A Filariasis Control Programme was instituted in 1961; it is now integrated into the basic health service programme but supervised by a distinct filariasis division. No large-scale vector control measures are in effect, though use of impregnated bednets and repellents is encouraged; DEC chemotherapy is the sole control strategy employed, with various schedules being used to treat asymptomatic microfilaraemic persons and clinical cases of both bancroftian filariasis (found along the Myanmar border and thought to be imported by refugees from that country) and brugian filariasis (endemic in southern Thailand). Surveillance is performed in index areas once every two years. The overall objective is to reduce microfilarial carrier rates to at least 0.6% in all endemic areas and then to interrupt both transmission and the occurrence of lymphoedema/elephantiasis.

3. New Research Findings Giving Rise to New Control Strategies

3.1 Infection Control (Chemotherapy)

Currently there is but one available drug, diethylcarbamazine (DEC), registered for use in treating lymphatic filariasis (reviewed in ref. 26). However, a second drug, ivermectin (the current mainstay for controlling morbidity in onchocerciasis [27]),

has been evaluated extensively in recent years against lymphatic filariasis (reviewed in ref. 28), and though not yet registered for such use, it seems destined eventually to become another important tool for the control of both bancroftian and brugian filaria infection. Furthermore, despite this relative paucity of drugs for controlling lymphatic filariasis, remarkable findings about optimal ways in which DEC and ivermectin can be used (alone and in combination) have been made in recent years (29). This information has spawned the development of both new control strategies and renewed optimism that control programmes can be successful.

DEC and ivermectin are primarily microfilaricidal drugs, though it is clear that for DEC (and possibly for ivermectin) there is macrofilaricidal activity as well (26). Moreover, even if these drugs had only microfilaricidal effects, success should still be anticipated in control programmes where they are used, both because prolonged clearance or decrease of microfilariae from the blood helps to reduce transmission of infection, and because reduced transmission and decreased levels of microfilaremia in a community have long been recognized to have a positive 'clinical effect' on infected subjects (i.e., decreased frequency of ADL attacks which lead to decreased incidence of clinical lymphoedema [30]), and thus enhanced compliance in community treatment programmes.

3.1.1. *Drug regimens available for filariasis control - Comparative efficacy*

(i) 'Standard' 12-day (*W. bancrofti*) or 6-day (*B. malayi*) courses of DEC administered repeatedly - often at one year intervals - as mass treatment to affected communities have commonly formed the basis of anti-filarial control programmes (26). Such regimens, however, have proven to be expensive and difficult to administer both because of the drug's causing rapid parasite death that leads to fever and malaise ('systemic adverse reactions'), local inflammatory reactions ('localized adverse reactions') or gastrointestinal symptoms (the major DEC pharmacological 'side effect') in many who were initially microfilaraemic but entirely asymptomatic (31). Indeed, it is largely because this therapeutic regimen was so unpopular that alternative treatment regimens have been sought. Furthermore, while these same 'standard courses' of DEC have also been used in treatment programmes focused on 'selective chemotherapy' where only microfilaraemic individuals were treated, this strategy, too, has proven to be cumbersome and unworkable both for the reasons affecting mass treatment programmes and because of the additional resources necessary to carry out diagnostic procedures on the entire population in order to identify the microfilaraemic individuals requiring treatment. Thus, 'standard-course DEC' *can* be effective for mass chemotherapy but at a cost in resources, health personnel and patient compliance that makes it impractical for most control programmes.

(ii) Single-dose ('spaced dose') DEC given at weekly, monthly, 6-monthly or yearly intervals has been enthusiastically advanced for many years by workers especially in the Pacific Islands and Indonesia (19,32-34); more recently, numerous controlled clinical trials have reaffirmed the efficacy of such regimens (29). While more frequent single-dose DEC (usually weekly or monthly) regimens are effective in decreasing microfilarial prevalence and density, their advantage over yearly or 6-monthly DEC may not be great enough to warrant the increased expense of more frequent drug delivery (33). For bancroftian filariasis the largest experiences with control programmes using single-dose yearly DEC have been those carried out in Tahiti (n = 50,000; [32]) and Fiji (n = 7,600; [33]) where 4 or 5 yearly-administrations of single-dose DEC resulted in decreases in microfilarial prevalence of 57% and

86% respectively, and decreases in microfilarial density of 78% and 97% respectively. Similarly, for *B. malayi* a control programme in Kerala, India (n = 22,700 [35]) with 2 annual administrations of single-dose DEC resulted in a decrease in microfilarial prevalence of 75% and in microfilarial density of 81%. It is impressive that these community trials, even though lacking complete coverage of the population at each round of treatment, yielded reductions in microfilarial densities that approximate those seen when individuals have been treated with single doses (or with the 12-day 'standard course') of DEC and followed sequentially for 12 or more months (reductions in microfilarial density of 92-96% at 1 year [29,36-38]).

(iii) Single-dose ivermectin has not yet been used in large-scale community control programmes for lymphatic filariasis, but its effectiveness against microfilariae of both *W. bancrofti* and *B. malayi* has been evaluated in individual patients for periods of 12-24 months after drug administration. Numerous earlier studies had examined the effectiveness of lower ivermectin dosages, but it is clear now that a dose of 400 µg/kg yields definitely superior microfilaricidal activity (29,39). While microfilarial prevalence fell by only 36-70% at 12 months post-treatment, this dose decreased microfilarial densities by 86-99% for 12-24 months post-treatment in both *W. bancrofti* and *B. malayi* infections. Thus, since single yearly (or even 2-yearly) doses of ivermectin appear equally effective as similar dosing with DEC, ivermectin alone would be a valuable alternative control tool for use in endemic communities, especially where the use of DEC is contraindicated (as in areas where onchocerciasis or loiasis co-exists).

(iv) The combination of single doses of DEC and ivermectin appears to be significantly more effective than either drug alone (29). Again, no community studies have been carried out, but at 12 and 24 months post-treatment 3 published studies (38,40-42) comprising a total of 33 *W. bancrofti* infected patients receiving an ivermectin/DEC combination showed a fall in microfilarial prevalence of 45-70% and a decrease in microfilarial density of 96-99+%. Furthermore, the dose of ivermectin used in these studies was only 20 µg/kg (with 6 mg/kg DEC), not the 400 µg/kg ivermectin dosage now felt to be optimal. In on-going trials a similar number of patients receiving the combination regimen of 6 mg/kg DEC and either 400 µg/kg ivermectin (in French Polynesia or 200 µg/kg (in India) also showed superior responses one year after treatment (>98% microfilarial reductions) compared to single doses of ivermectin or DEC alone (approximately 90% reductions). Thus, while data on this combination given at yearly or 2-yearly intervals are still preliminary, the potential value of the 'IVER/DEC' combination for use as a chemotherapeutic control tool appears most promising.

(v) DEC-fortified salt (with DEC concentrations ranging from 0.1-0.6%) can be used as a substitute for normal cooking and table salt since DEC is chemically stable. When consumed for periods of 6-9 months it has regularly decreased microfilarial prevalence by 70-100% in both bancroftian and brugian filariasis (43). DEC-fortified salt has been used as a mainstay for control programmes in very large populations in China, Taiwan and India, with excellent results that substantiate observations made on patients followed individually and in whom prevalence of *W. bancrofti* microfilaraemia has been shown to decrease by 97% after 4 months of DEC-salt usage and

whose microfilarial densities fell even more dramatically, by greater than 99% (44). Though this strategy of DEC-salt usage does appear both workable and highly effective, essentially all of the communities in which it has been employed thus far have only had access to salt supplies that were strictly controlled by health care authorities.

3.1.2 *Adverse reactions*

The adverse reactions (both systemic and localized) developing after DEC and ivermectin treatment (even single doses) have been extensively reviewed (31,45). The systemic reactions are likely the manifestation of host inflammatory responses to parasite antigens liberated by rapid death of the microfilariae, while the localized adverse reactions are probably induced by death of the adult parasites. Such reactions are almost unavoidable, but they can be reasonably well tolerated by individuals or populations, especially if it is not necessary to have the 'long-term' compliance required to complete the 6-12 day 'standard-courses' of DEC.

Interestingly, however, not all of the chemotherapeutic control regimens described above induce the same degrees of adverse reaction. Without question, the regimen causing fewest adverse reactions is DEC-fortified salt usage, most individuals having no adverse reactions at all (43). Similarly, a recent study comparing the adverse reactions induced by different DEC regimens confirmed earlier anecdotal findings that greater 'adverse reactivity' is seen following 'standard course' 12-day DEC administration than after single-dose DEC (31). Finally, when adverse reactions of single-dose DEC and single-dose ivermectin have been compared, the degree of reactivity has generally been similar and clinically very acceptable for both drugs, though the character of the reactions (greater systemic reactions with ivermectin and more frequent localized reactions with DEC) differs somewhat (31,38,46).

3.1.3 *Macrofilaricidal activities of DEC and ivermectin*

Evidence that DEC can kill adult worms as well as microfilariae is both indirect (long-term absence of microfilariae from the blood post treatment, clearance of parasite antigen from the blood) and direct (development of inflammatory nodules containing dead parasites post-treatment, observed cessation of activity of adult worms by ultrasound techniques [26,47,48]). What is also clear, however, is that not all adult worms are killed by a single dose (or single course) of DEC and that long-term or repeated treatment is necessary to eradicate infection (26,48). The reasons for this only-partial macrofilaricidal effect of DEC are not known.

Still less certain is the degree of macrofilaricidal activity that ivermectin has, some recent studies suggesting similar levels of macrofilaricidal activity for ivermectin and DEC on *W. bancrofti* parasites (49) and others suggesting complete absence of macrofilaricidal activity for ivermectin (50).

3.2 Morbidity control

3.2.1 *Adenolymphangitis and lymphoedema/elephantiasis*

The potential for morbidity control has been greatly advanced in recent years by increased understanding of the pathogenesis of both lymphoedema and acute adenolymphangitis (ADL) in patients living in filariasis endemic areas (8,51,52). ADL episodes are characterized by pain, lymph-adenitis, lymphangitis, and inflammation in the affected limb or scrotum, that are usually accompanied by fever, chills and other systemic symptoms. Although ADLs have long been recognized as regularly associated with filarial disease, their aetiology has remained uncertain, sometimes being ascribed to parasite toxins, sometimes to host immunologic responses, and sometimes to bacterial infection. Recent evidence, both from astute clinical observations and from immunohistological and bacteriological studies of tissue from lymphoedematous limbs of affected patients, has suggested that

bacterial or fungal superinfections of limbs with compromised lymphatic function play the primary role in triggering most episodes of ADL (8,51,52), which, themselves, actually cause or exacerbate the elephantiasis changes in affected patients.

A major implication of this new understanding is that *simple measures of hygiene*, coupled with *local (or in severe cases, systemic) antibiotics* given prophylactically, can have profound effects in preventing these damaging episodes of ADL and even in allowing the host to repair and recover from some or all of the overt damage caused by filarial infection and subsequent superinfections (8,51,52). Trials are in progress to determine the optimal regimens for managing such patients, but it is clear that diligent attention to local hygiene of the affected limbs will have markedly positive benefits. Preliminary evidence also suggests that community-based *patient self-help groups* work extremely effectively to stimulate and maintain personal compliance with the vigorous hygiene regimens required for this morbidity control; and this newly enunciated strategy is clearly one that can be exploited worldwide, because nowhere are such patients lacking in the intense desire to rid themselves of their debilitating and ostracizing deformities. Further validation and utilization of this approach should lead to dramatic decreases in the morbidity caused by filariasis that should, in turn, have profound socio-economic impact in endemic countries.

3.2.2 *"Asymptomatic" microfilaraemia*

The second new approach to controlling the morbidity of lymphatic filariasis derives from now recognizing the urgency of treating patients with 'asymptomatic microfilaraemia'. The ability of such individuals to remain asymptomatic probably relates to their immunologically down-regulated state (53), but two sets of recent observations have revealed that this being clinically 'asymptomatic' in no way implies freedom from 'morbidity'. First, it was recognized that most of these microfilaraemic individuals have haematuria and/or proteinuria that reflects low-grade renal damage which does appear generally to be reversible after treatment (11). Second, and even more dramatic, were the observations by several groups of investigators using lymphoscintigraphy to visualize by radioisotope tracer techniques the functional anatomy of the lymphatic vessels (12,13). What was seen was quite surprising, as almost all of these infected individuals, even though asymptomatic, had markedly abnormal, dilated lymphatics and markedly abnormal patterns of lymph flow. Though reversibility of these lymphatic abnormalities with treatment has not yet been demonstrated, it is clear that the asymptomatic microfilaraemic state is not so benign as initially believed, and such patients should probably be treated as early as possible to prevent or limit irreversible damage to the lymphatic and renal systems.

Finally, the further recognition from lymphoscintigraphy studies that lymphoedema is not always the result of occlusion of lymphatic channels but can also occur when there are extensive collaterals (12,13) confirms the expectation that alternative lymph flow patterns can be established through lymphatic collaterals. Again, such findings have important practical implications for morbidity control, since they suggest that even the so called 'burnt-out' cases with gross lymphoedema and elephantoid changes can be helped. The treatment of such cases should be aggressive and should employ the most appropriate tools available, be they foot care, antibiotics, other drugs or even, in those special cases where indicated, surgical shunt procedures (54). Not only do the treated individuals themselves benefit tremendously from the reversal of such morbidity, but community control programmes also become more successful, since these 'visible' improvements can be appreciated by all in the endemic communities.

3.3 Vector control

Vector control has played an important supporting role for filariasis control in many local programmes, and the reduction of vector density can be an important contributor to sustained interruption of transmission. However, control programmes based entirely on vector reduction have rarely been continued long enough to decrease the

prevalence of filarial infection in human populations, and experience suggests that for its greatest impact vector control should be implemented within the framework of an integrated filariasis control programme based on drug administration.

Certain new technologies are now available to improve vector control efforts, though all still require further assessment of their long-term impact on infection in the human population. These include the following:

(i) **Biocides**: The toxin-producing bacterium *Bacillus sphaericus* is the most promising new biocidal candidate for controlling larvae of *Culex quinquefasciatus*, the main vector of lymphatic filariasis in many endemic areas of the world (55), and even for controlling the *Mansonia* vectors of brugian filariasis in certain regions (56). Appropriate formulations of this microbial agent have shown significant residual activity against *Cx. quinquefasciatus* and *Cx. pipiens* in highly polluted breeding habitats, and this bacterium has the potential to persist and recycle under field conditions for up to 3 months. It is environmentally safe and suitable for integrated control programmes with community participation. The estimated cost for vector control programmes using *B. sphaericus* has been estimated as less than US $0.5 per person per year in areas where breeding habitats of mosquito vectors are very common. In recent large-scale field trials in north Cameroon, Brazil, India, Sri Lanka and Tanzania a remarkable impact of *B. sphaericus* use has been observed in reducing vector biting density by 80% through bi-monthly treatment of mosquito larval habitats; in addition, there was a significant decline in the proportion of *Culex* carrying filarial infective larvae. Thus *B. sphaericus* (alternated with *B. thuringiensis*) may prove to be the selective mosquito-control agent of choice for use against *Cx. quinquefasciatus* in integrated control programmes.

(ii) **Polystyrene beads:** Control of mosquito vector breeding in closed water systems (pit latrines and cesspits) through use of expanded polystyrene beads has been extremely effective in certain urban areas with endemic filariasis (57).

(iii) **Insecticide-impregnated bednets and curtains:** Use of insecticide-treated bednets has been successfully employed in numerous countries to control the anopheline vectors of malaria (58). The value of these methods for filariasis control must still be determined, but preliminary findings from Papua New Guinea are promising.

(iv) **New formulations of pyrethroids:** Synthetic pyrethroids with long-lasting residual effects (up to one year) can be highly successful in controlling adult mosquitos when used for total indoor spraying in urban settings (59). Furthermore, new repellent formulations (soap with DEET and permethrin as active ingredients) have good efficacy against *Mansonia* adults and residual protection when applied on human skin (60). Among the household insecticide products, mosquito coils that contain knockdown synthetic pyrethroids also give reasonably good protection against *Culex* and *Mansonia* mosquitos.

(v) **Integrated vector management:** Rapid unplanned urbanization is associated with problems of inadequate water supply, poor sewage disposal, insufficient solid waste management and poor water drainage, all of which result in a profusion of breeding habitats for *Cx. quinquefasciatus* and in increased filariasis transmission. While repairing septic tanks and upgrading the quality of pit latrines should be considered important components of vector

control campaigns in urban areas, the joint efforts of high-level policy and decision makers with health authorities and municipal planners are also required. Moreover, linkage with non-health sectors must also occur within municipalities to ensure their involvement through carefully developed intersectoral collaboration. Finally, eliciting and sustaining community interest and participation in mosquito control programmes should be important components of integrated vector management, as clearly indicated in numerous examples of successful community participation in the removal of aquatic plant breeding habitats of *Mansonia* mosquitos and in undertaking commercialization of larvivorous/ phytophagous fish culture in such habitats, both of which have contributed greatly to sustainable reductions of mosquito populations (61).

3.4 Programme development and oversight

Though the tools necessary to control lymphatic filariasis may well now be in hand, it is necessary to develop and evaluate appropriate implementation strategies that will not only be economical but also be acceptable to the community and sustainable for long periods. Simultaneous development of appropriate monitoring and surveillance methods is also a prerequisite for successful programme management.

3.4.1 *New tools for diagnosis and epidemiological assessment and monitoring*

Diagnosis of active infection is important for determining the level of endemicity of filariasis and for evaluating the success of control measures. At present, however, the identification of microfilariae in the blood (usually, of necessity, sampled at night) is the only absolute indicator of active infection utilized for large populations, and the problems associated with this diagnostic approach are well recognised (including the fact that some actively infected patients have no circulating microfilariae). In addition, antibody-based assays, the usual type of immunodiagnostic test used to date, generally cannot distinguish between active and prior infection; they also have significant problems with specificity, since individuals are often concurrently infected by 'cross-reacting' gastrointestinal parasites.

Important new diagnostic tools, however, have recently become available; these are the following:

(i) Assays to detect circulating filarial antigen (CFA)

The most recent and promising immunodiagnostics are circulating antigen assays that can identify patients with either microfilaraemic or occult infections; thus, they are of particular value for determining endemicity of infection and efficacy of control measures. The 'first generation' of such assays detected circulating phosphorylcholine-containing antigens and proved helpful in assessing infection rates in areas where transmission had been altered by insecticide spraying, in evaluating reinfection following administration of DEC, and in determining possible infection in amicrofilaremic persons (62). More recent diagnostic tests have detected protein antigens whose epitopes react with the monoclonal antibodies Og4C3 (63) and AD12 (64). These assays detect circulating antigens in sera from essentially all microfilaraemic and a proportion of amicrofilaraemic persons residing in *W. bancrofti* endemic areas. Importantly, the levels of circulating antigen appear constant throughout the day (unlike microfilaraemia) and fall to zero after successful chemotherapy has killed the adult worms. *Unfortunately, no comparable assays exist for* B. malayi *infections.*

(ii) DNA-detection assays

DNA-based technology can now also be used for diagnosis of filarial infection both in humans and in the mosquito vectors by polymerase chain reaction (PCR)-based assays which provide outstanding sensitivity and specificity. For *B. malayi*, PCR techniques can detect a single L3 in pools of up to 100 mosquitos, a single microfilaria in 1 ml of blood, or the equivalent of 1 µg of DNA in 100 µl of blood (65). Recently a similar PCR assay for *W. bancrofti* has been developed with similar sensitivity (66). It is estimated that one technician can now use these assays to screen up to 3600 mosquitos (36 runs of 100 mosquitos each) or 1,000 blood samples in *one* day. The current cost for materials (primarily for the enzymes required for PCR) is US $1.00 per run.

The advantages of PCR-based tests include high degrees of sensitivity and species-specificity, their detection of only current infections, and the rapidity with which their results can be obtained (same day). In addition, samples can be preserved at ambient temperature for months and shipped to a central laboratory for assay. The primary drawbacks of this technology are the special training and equipment required, and the need for its performance in a central laboratory with good quality control. In addition, its use in assessing transmission of infection in vectors requires further validation in order to relate the semiquantitative PCR output to the transmission indices in standard use that are based on detection of infective larvae in dissected mosquitoes.

(iii) Rapid epidemiological assessment

In part because lymphatic filariasis is geographically widespread but often focal, rapid epidemiological assessment is essential for mapping the distribution of infection in order to select appropriate control strategies in specific epidemiological situations.

Currently, night blood surveys are the primary method for determining the level of endemicity in a community, and it is this technique that must be replaced by some more 'rapid assessment' method such as: (a) estimation of disease or mf carrier rates through review of existing health reports and hospital/clinic records; (b) clinical examination of adult males for hydrocoeles, with extrapolation to gauge overall prevalence of infection; (c) analysis of mosquito vectors for infection, using traditional entomologic methods or even DNA-based larval detection, if cost-effective and feasible; (d) evaluation of antigenaemia rates in daytime, finger-prick blood specimens from children or other cohorts of the population.

3.4.2. *Predictive models*

Mathematical models now serve as powerful tools for analysis, prediction and evaluation of control strategies in several parasitic infections (67,68), and development of such models is particularly important for lymphatic filariasis since the overall infection/transmission cycle involves particularly complex interactions among the human, parasite and vector populations (69,70). Furthermore, the very long time scales of the processes of filarial infection and disease also mean that such models can provide cost-effective tools for studying both the population dynamics of transmission and the consequences of control. Indeed, recent experience with the simulation model (ONCHOSIM) developed for the Onchocerciasis Control Programme in West Africa (67) has highlighted the usefulness of such models for aiding the design of control strategies, analyzing the relative efficacy of different intervention strategies and providing precise information on cost-effectiveness of the various approaches.

3.4.3 *Social and economic issues in control programmes*

3.4.3.1 Socioeconomic findings

Because of a dearth of information on both social impact and economic costs of lymphatic filariasis, research studies initiated by WHO/TDR are currently collecting data on these aspects of the disease. The important results of these studies (carried out in India, Ghana, Tanzania and the Philippines) will be available in 1995 and will detail social attitudes towards the disease, the direct and indirect costs of acute and chronic disease, and the extent of disease in women. The results should be useful in quantifying the socioeconomic burden of the disease and in providing indicators for evaluating the success of intervention control strategies.

3.4.3.2 Community participation

Community participation is a recognized prerequisite for successful control programmes based on integrated vector control and filarial disease control (61), but the type and level of community involvement will depend on the characteristics of the target community.

The most frequently encountered barriers to engendering community participation in filariasis control are:

(i) the perception that filariasis is not serious because it is not a fatal disease,

(ii) the fact that it has a slow progression to chronic sequelae,

(iii) the heretofore absence of hope for clinical cure among people with elephantiasis,

(iv) a lack of awareness of the cause of the disease, and

(v) the perception, particularly among urban dwellers, that their taxes are sufficiently high that governmental agencies should be able to solve public health problems without further community involvement.

As demonstrated, however, in many of the most successful filariasis control programmes, the characteristics of success in engendering community participation include a 'horizontal' community-based approach, a 'bottom-up' strategy, and, especially, linking the programme with *income-generating* activities (61).

4. Conclusion

Lymphatic filariasis is more widespread and inflicts a very much greater disease burden worldwide than was recognized even three years ago at the time of the last WHO Expert Committee on the Control of Lymphatic Filariasis (2). The availability of new, simplified, effective and affordable control strategies together with the recent designation of lymphatic filariasis as one of only six infectious diseases considered eradicable or potentially eradicable (71) makes this an ideal time to initiate a global programme to control or eliminate this disease from all endemic countries and to assert the optimistic expectation that such a programme will be successful.

4.1 Recommendations for Control Strategies

(a) The focus of control efforts should be on treating the infection in human populations, with vector control serving a supporting role when feasible and affordable.

(b) 'Mass-distribution' programmes should completely replace those based on a 'selective-treatment' strategy (i.e., detection of microfilaraemics who are then treated 'selectively').

(c) Regimens recommended for mass treatment in areas where there is *no* co-existing onchocerciasis or loiasis would be *either of the following*:

  (i) DEC-fortified salt (0.2 - 0.4%) used in place of regular salt for all cooking and seasoning for a period of 9-12 months;
  (ii) Single, annual or semi-annual mass administration of DEC (6 mg/kg body weight) for 5-10 years.

(d) When ivermectin becomes registered for use in lymphatic filariasis, two additional mass treatment regimens will be available:

  (i) ivermectin (400 µg/kg) given once yearly - a regimen safe in areas where onchocerciasis or loiasis might also be prevalent;
  (ii) ivermectin (400 µg/kg) plus DEC (6 mg/kg) given once yearly, *except in areas where onchocerciasis or loiasis co-exists.*

(e) Adjunctive vector control could include the use of biocides (especially *Bacillus sphaericus*), polystyrene beads, insecticide impregnated bednets and curtains, long-lasting residual pyrethroids, and community supported vector management, as locally appropriate.

4.2 Operational Research Needs

Though *currently available information is sufficient to justify the immediate initiation of large-scale filariasis control or elimination programmes*, there are still important issues which, if resolved, would considerably enhance programme design and implementation; specifically, these issues/needs are the following:

(a) more precise estimates of the global, regional and national burden of illness caused by lymphatic filariasis, and rapid assessment techniques to help make these estimates;

(b) a control strategy able to be used safely and effectively in areas where bancroftian filariasis may co-exist with onchocerciasis or loiasis (i.e., one based on ivermectin delivery, on use of DEC-fortified salt if proven safe, or on wide-scale vector control); large areas of Africa would thus be 'opened' for treatment of lymphatic filariasis;

(c) detailed, cost-effectiveness analyses (CEA):

- comparing yearly mass treatment and (DEC) fortified-salt approaches to

controlling lymphatic filariasis, (including ways in which the delivery of anti-filarial medication can be integrated with other health and non-health delivery systems);

- for vector control - not as a single option for filariasis control, but as a potential adjunct to chemotherapeutic strategies based on annual mass treatment or use of DEC-fortified salt;
- of surveillance and rapid assessment procedures under actual conditions of implementation - in particular, comparing DNA-based techniques and mosquito dissection for detection of vector infectivity, and comparing assessment of blood antigenaemia both with microfilarial detection by microscopy and with clinical or historical techniques for determining prevalence of infection in a community;

(d) delineation and quantification of the economic and social costs of filarial disease, including the costs both to individuals and to the national health care budget for management of elephantiasis, hydrocoele and adenolymphangitis;

(e) further definition of the clinical consequences of 'asymptomatic' microfilaraemia (in addition to the newly-recognized lymphatic and renal function abnormalities), as these consequences are relevant to calculating the social and economic costs of filarial disease;

(f) evaluation of simple measures such as local hygiene and foot care and the use of antibiotics locally or systemically for preventing or controlling morbidity;

(g) evaluation of the personal and social psychology of compliance with annual mass treatment or long-term fortified-salt usage, and of decision-making in the personal-choice use of fortified salt;

(h) predictive models, particularly relevant to the kinds of information required by control managers for use as tools for monitoring control programmes;

(i) uniform surveillance and monitoring techniques so that *types* of site-specific control strategies can be defined, as well as those areas where total eradication of infection will be most easily achieved.

TABLE 1a

Global burden of bancroftian filariasis by sex and demographic region.
Estimates: upper number = cases in millions; lower number (in brackets) = prevalence (%) in region.

Condition and sex	*World*	*Sub-Saharan Africa*	*India*	*China+*	*Other Asia and islands*	*Latin America and the Caribbean*	*Middle Eastern Crescent*
Population	4,119.86*	512	850	1,134	793	441	391
Microfilaraemia - Males	40.86 (1.95)	14.74 (5.82)	17.00 (3.87)	2.25 (0.39)	6.54 (1.63)	0.19 (0.08)	0.13 (0.06)
Microfilaraemia - Females	32.41 (1.60)	13.13 (5.07)	12.46 (3.04)	1.80 (0.33)	4.79 (1.22)	0.13 (0.06)	0.11 (0.06)
Lymphoedema - Males	5.36 (0.26)	1.78 (0.68)	2.60 (0.60)	0.06 (0.01)	0.92 (0.23)	0.014 (0.006)	0.027 (0.01)
Lymphoedema - Females	7.81 (0.39)	2.86 (1.10)	3.98 (0.97)	0.05 (0.009)	0.87 (0.22)	0.017 (0.008)	0.029 (0.02)
Hydrocoele - Males	26.79 (1.28)	10.20 (4.03)	12.88 (2.93)	1.68 (0.29)	1.90 (0.48)	0.057 (0.03)	0.06 (0.03)
*Total cases - Males***	66.65 (3.18)	24.28 (9.60)	29.43 (6.70)	3.62 (0.62)	8.87 (2.21)	0.246 (0.11)	0.207 (0.10)
*Total cases - Females***	39.54 (1.95)	15.74 (6.08)	16.10 (3.92)	1.84 (0.34)	5.59 (1.42)	0.149 (0.07)	0.135 (0.07)

* Total population in regions where significant infection exists. Population figures and regions as given and defined for the World Bank Global Burden of Disease Study.

** Equals sum of the number of patients with microfilaraemia alone plus the number of patients with overt disease (lymphoedema or hydrocoele) less the number with both overt disease and microfilaraemia (estimated at 0.9% for lymphoedema and 22% for hydrocoele [see ref. 5 for details of this estimation].

\+ *N.B.* The figures in this column are based on estimates as calculated in ref. 5. Official Chinese government estimates are different, as follows: Population (in millions) 344; microfilaraemia (males: 0.05; females: 0.05); lymphoedema (males: 0.06; females: 0.05); hydrocoele (male only: 0.42); chyluria (males: 0.24; females 0.23); total cases (males: 0.75; females: 0.33).

TABLE 1b

Global burden of brugian filariasis by sex and demographic region.
Estimates: upper number = cases in millions; lower number (in brackets) = prevalence (%) in region.

Condition and sex	*World*	*India*	*China+*	*Other Asia and islands*
Population	2,776.35*	850	1,134	793
Microfilaraemia - Males	6.515 (0.45)	1.105 (0.25)	2.235 (0.38)	3.175 (0.79)
Microfilaraemia - Females	3.840 (0.28)	0.692 (0.17)	1.250 (0.23)	1.895 (0.48)
Lymphoedema - Males	1.804 (0.13)	0.582 (0.13)	0.461 (0.08)	0.761 (0.19)
Lymphoedema - Females	1.004 (0.07)	0.282 (0.07)	0.271 (0.05)	0.452 (0.12)
*Total cases - Males***	8.159 (0.57)	1.635 (0.37)	2.655 (0.45)	3.869 (0.97)
*Total cases - Females***	4.752 (0.35)	0.949 (0.23)	1.496 (0.27)	2.306 (0.59)

* Total population in regions where significant infection exists. Population figures and regions as given and defined for the World Bank Global Burden of Disease Study.

** Equals sum of the number of patients with microfilaraemia alone plus the number of patients with overt disease (lymphoedema or hydrocoele) less the number with both overt disease and microfilaraemia (estimated at 0.9% for lymphoedema and 22% for hydrocoele [see ref. 5 for details of this estimation].

+ *N.B.* The figures in this column are based on estimates as calculated in ref. 5. Official Chinese government estimates are different, as follows: Population (in millions) 344; microfilaraemia (males: 0.005; females: 0.005); lymphoedema (males: 0.25; females: 0.22); total cases (males: 0.255; females: 0.225).

TABLE 2a

Global burden of bancroftian filariasis by age-group and sex.
Estimates: upper number = cases in millions; lower number (in brackets) = prevalence (%).

	Age in years					
Condition and sex	***0-4***	***5-14***	***15-44***	***45-59***	***60+***	***Total***
Population*	551.89	918.36	1,932.49	432.02	285.10	4,119.86
Microfilaraemia - Males	1.44 (0.51)	5.75 (1.22)	24.54 (2.48)	6.15 (2.81)	2.99 (2.18)	40.86 (1.95)
Microfilaraemia - Females	1.21 (0.45)	5.69 (1.27)	18.22 (1.93)	4.55 (2.13)	2.75 (1.86)	32.41 (1.60)
Lymphoedema - Males	0.05 (0.01)	0.28 (0.06)	2.84 (0.06)	1.39 (0.64)	0.79 (0.58)	5.36 (0.26)
Lymphoedema - Females	0.08 (0.03)	0.66 (0.15)	3.61 (0.38)	1.18 (0.85)	1.65 (1.11)	7.81 (0.39)
Hydrocoele - Males	0.06 (0.02)	1.82 (0.39)	15.62 (1.58)	5.65 (2.58)	3.64 (2.66)	26.79 (1.28)

* Total population in regions where significant infection exists. Regions as defined for the World Bank Global Burden of Disease Study.

TABLE 2b

Global burden of brugian filariasis by age-group and sex.
Estimates: upper number = cases in millions; lower number (in brackets) = prevalence (%).

	Age in years					
Condition and sex	***0-4***	***5-14***	***15-44***	***45-59***	***60+***	***Total***
Population*	340.19	578.03	1342.36	308.54	207.21	2776.35
Microfilaraemia - Males	0.203 (0.12)	0.899 (0.30)	4.05 (0.58)	0.882 (0.55)	0.482 (0.47)	6.515 (0.46)
Microfilaraemia - Females	0.197 (0.11)	0.552 (0.20)	2.27 (0.35)	0.462 (0.31)	0.348 (0.33)	3.84 (0.28)
Lymphoedema - Males	0.018 (0.01)	0.047 (0.015)	0.759 (0.11)	0.506 (0.32)	0.472 (0.46)	1.804 (0.13)
Lymphoedema - Females	0.008 (0.00001)	0.027 (0.01)	0.349 (0.05)	0.299 (0.20)	0.328 (0.31)	1.004 (0.07)

* Total population in regions where significant infection exists. Regions as defined for the World Bank Global Burden of Disease Study.

TABLE 3

Filariasis control efforts in selected endemic countries

Country*	Estimate of prevalence (millions)	% under Active Control Programme	Yearly operational expenditure for filariasis control (US $)	Control ** strategy
China	1.58	100%	1,279,000	D
Egypt	0.35	10%	500,000	D, V
French Polynesia	0.02	90%	50,000	D
India	36	10%	1,000,000	D, V
Indonesia	N.A.	N.A.	N.A.	D
Malaysia	0.003	60%	500,000	D
Papua New Guinea	1.0	<1%	90,000	D
Philippines	1.02	32%	27,100	D
Sri Lanka	0.05	60%	300,000	D
Tanzania	1.5	0%	0	V
Thailand	0.62	30%	1,000,000	D

* All data supplied by country representatives in attendance

** D = DEC treatment regimen; V = Vector control programme
N.A. - Not available

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WHO/CTD/TDR

LYMPHATIC FILARIASIS INFECTION & DISEASE: CONTROL STRATEGIES

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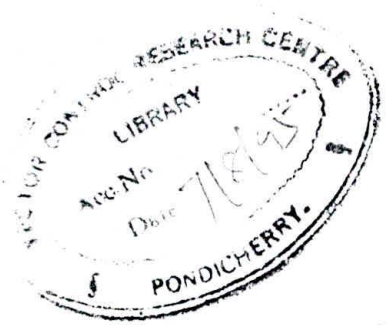

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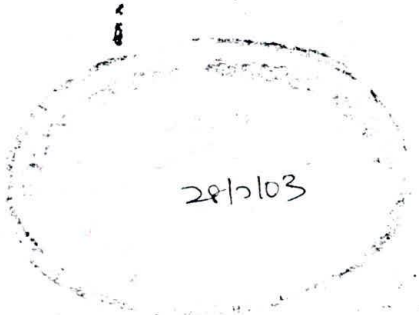
REVISED STRATEGY FOR FILARIASIS CONTROL IN INDIA



A PILOT PROJECT

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REVISED STRATEGY FOR FILARIASIS CONTROL IN INDIA - A PILOT PROJECT

INTRODUCTION

Lymphatic Filariasis caused by *Wuchereria bancrofti* (bancroftian filariasis) is a wide spread public health problem in india and 1996 estimates indicate that about 428 million population is living in filariasis endemic areas spread over 18 states and Union Territorries Of this, 113 million population is living in urban areas Within these 18 states, an estimated 28 01 million population is harbouring the microfilaria and thus serve as reservoir of infection in the community Further, an estimated population of about 21 23 million is suffering from the disease with perceptible disease manifestations in these areas These estimates, though include filariasis caused by *Brugia malayi* also, but the latter accounts only for less than 0 6 per cent of the total estimates and is restricted to rural areas in a few pockets in coastal west Kerala and six other states Bancroftian filariasis is transmitted through *Culex quinquefasciatus* mosquitoes and largely exhibits nocturnal periodicity except in Nicobar group of islands where the diurnal type of *W bancrofti* is transmitted through mosquitoes belonging to *Aedes (Finlaya) niveus* group

FILARIASIS CONTROL IN INDIA

National Filaria Control Programme (NFCP) was initiated in 1955 with following objectives

(I) to delimit the problem
(ii) to undertake large scale control programme in endemic areas, and
(iii) to train the professional and ancilliary personnel required for the programme

Initially the programme was launched with the following strategy

- mass DEC therapy at a dosage of 4 mg /kg body weight for 5 days
- three rounds of indoor dieldrin residual spraying in rural areas, and
- weekly antilarval operations in urban areas

REVISED STRATEGY FOR FILARIASIS CONTROL IN INDIA - A PILOT PROJECT

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The mass drug therapy for 5 consecutive days was withdrawn after initial experiences because of mild side effects of the therapy and poor compliance. The insecticidal spraying in rural areas had to be stopped due to development of resistance among vectors.

The strategy was then modified in pursuance of the recommendations of Second ICMR Assessment Committee and the revised strategy included chemotherapy on selective basis with a 12 day regimen of DEC @ 6 mg/kg body weight per day for positive cases and weekly antilarval operations in endemic urban areas. The programme was withdrawn from rural areas for operational and technical constraints as mentioned above. However, a few years back in 1994-95, selective DEC treatment through PHC system has also been introduced in rural areas. For delimitation of the problem, Filaria Survey Units, for diagnosis and treatment, Filaria Clinics and for antilarval operations, Filaria Control Units were established. At present, 206 NFCP Control Units, 199 Filaria Clinics and 27 Survey Units are operating in endemic urban areas under NFCP. Though at present only about 11 per cent of the total population living in filaria endemic areas is provided protection through NFCP, there has been a marked reduction in microfilaria rates in about 88 per cent of the towns covered under NFCP control operations for more than five years. Further, 69 per cent of these towns have also shown about 69 per cent decline in disease rates.

State	District(s)	Population (1996 estimates)
1. Andhra Pradesh	East Godavari	5.03 million
	Srikakulam	2.55 million
2. Bihar	Darbhanga	2.57 million
	Siwan	2.56 million
3. Kerala	Alappuzha	2.83 million
	Kozhikode	2.16 million
4. Orissa	Puri	3.38 million
	Khurda	1.67 million
5. Tamil Nadu	North Arcot	5.36 million
	South Arcot*	4.99 million
6. Uttar Pradesh	Gorakhpur	1.45 million
	Varanasi	5.43 million
7. West Bengal	Purulia	2.31 million
		42.29 million

* already observed Filaria day on 5.8.96 proposed for monitoring and continuance of revised strategy

2. Strategy

2.1. Target Age group

All individuals belonging to all ages except infants (children below the age of 1 year & pregnant women) will be provided single dose therapy

2.2. Drug regimen

DEC at the dosage of 6 mg/kg body weight will be administered to all the individuals within the target group. As it is not possible to calculate individual dose on body weight on the spot during a mass therapy campaign, following age based average dose schedule will be adopted .

Age	DEC dose	No. of tablets	
		(50 mg)	(100 mg)
≥ 17 years	300 mg	6	3
12 - 17 years	225 mg	4 5	2.25
6 - 11 years	150 mg	3	1 5
2 - 5 years	75 mg	.1 5	0.66
1 year	30 mg	0.66	0.33

2.3 Modalities of Drug administration

2.3.1. Observance of FILARIA DAY

An identified date will be observed as *FILARIA DAY* for administration of mass drug therapy. Tentatively, it is proposed to be observed in *III week of November*. On the Filaria day, all villages and schools etc. will be visited by identified workers to administer DEC therapy to all individuals except children below the age of 1 year and pregnant women.

REVISED STRATEGY FOR FILARIASIS CONTROL

Studies carried out in various parts of the World including India have indicated that a single day dose schedule of DEC can effectively reduce microfilaria and disease prevalence significantly if followed for either about 5 to 10 years or initially for 2 years supplemented by use of DEC medicated salt in following years. This strategy has helped Countries like Tahiti and Fiji where single dose yearly DEC regimen in 4 or 5 years administration, resulted in decrease in microfilaria prevalence of 57 per cent and 86 per cent respectively, and a decrease in microfilarial density of 78 per cent and 97 per cent respectively. In India also, with 2 single dose administration of DEC in Brugian filariasis in Kerala, a decrease in microfilarial prevalence by 75 per cent and microfilarial density by 81 per cent could be achieved.

The global recent advances in filariasis research and control have been discussed at length in WHO/CTD/TDR Consultative Meeting held at Universiti Sains Malaysia (22-24 August 1994) and the one of the recommendations of the meeting mentions :

'Mass-distribution' programmes should completely replace those based on a 'selective-treatment' strategy (i.e. detection of microfilaraemics who are then treated 'selectively').

Various aspects of filariasis control in Indian context have been discussed in a Workshop on " Revised Strategy for the Control of Lymphatic Filariasis In India" held at Delhi (4-5 January 1996). The experts from ICMR, NMEP, NICD and some of the endemic States including programme managers participated in the workshop. The workshop recommended initiation of a revised NFCP strategy on pilot scale covering endemic states and districts from 1996 and extension to all the endemic areas in the

country in phases by 1998. The workshop further recommended that the revised strategy will be an additional input on the existing strategy to make it technically more precise and cost effective so as to achieve the desired results.

The experiences clearly indicate a technical and operational advantage in adopting single dose mass DEC therapy over conventional 12 days selective therapy.

PROPOSAL FOR ADOPTING REVISED STARTEGY ON PILOT BASIS

In view of the recommendations made in support of revised single day DEC mass therapy as a supplement to existing NFCP strategy in highly endemic areas, it is proposed to implement this strategy in 13 identified districts on a pilot basis with a view to extend it to other areas based on the results of the pilot scale implementation.

TIME-FRAME

The revised strategy is proposed to be implemented initially for 5 years in identified areas.

METHODOLOGY

1. Selection of Area

Revised strategy will be implemented in identified areas for five years with an option of continuing the strategy based on the results of the pilot study. The study would cover 42.29 million population (1995 estimates) in13 highly endemic districts in 7 states so that by the end of five years impact in quantitative terms can be evaluated.

2.4. Vector Control

Existing level of vector control operations through Filaria Control Units in urban areas of these districts will continue.

Preparatory Activities for revised strategy

1. Preparation of detailed plan of action at the district level

Preliminary preparatory work has been done by the identified districts. The orientation of State/district level officers and finalization of microplans will be done in September 1997. An officer from Directorate NMEP and a state level officer will visit the district for progress monitoring during second/third week of October. The action plans will include identification of infrastructure and the operative areas etc. It is proposed to involve NGOs, School teachers and particularly workers of Revenue department like Gram Sevaks etc. This involvement of other sectors and community is proposed to be achieved by involving District Magistrates/ Collectors and Divisional Commisioners etc. A core group under the chairmanship of District Magistrate would be constituted with CMO/Civil Surgeon, Filaria Control Officer, DMO and other district level officers from health and related departments as the members to oversee the observence of Filaria Day.

2. Procurement and supply of drugs

Antifilaria drugs are proposed to be supplied by Directorate NMEP directly to the districts under intimation to State Programme Officerso as to ensure timely availability

3. Information Education Communication

An intensive IEC campaign shall be launched from 15 October 1996 with following major objectives

- to educate public about the revised filaria control strategy, advantages of single dose mass therapy, importance of community involvement in such campaigns, appeal to identify volunteers from among the community to help the programme in mass drug administration, appeal to co-operate by accepting mass therapy etc.
- to orient the opinion leaders
- to orient the medical fraternity in the area

All probable approaches will be made use of with involvement of District media and publicity units. Since it will be the first attempt in limited areas, state level resources shall also be mobilized for these purposes.

4. Orientation and training

The infrastructure identified for drug delivery on Filaria day will be trained by last week of October'97/first week of November'97 by the district and block level medical and health officers. Dte. NMEP will also extend its services whereever needed.

5. Logistics

5.1. Drugs

Though the main drug for mass therapy remains DEC, it is a well known fact that administration of DEC may cause mild side effects in microfilareamics particularly with high densities because of release of antigens as a consequence to the death of microfilaria. It is therefore suggested that availability with some supportive medicines like antipyretics and antiallergics may be ensured in these areas

5.2. Vehicles

It is proposed to utilize vehicles available under NMEP and NFCP and primary health care services for preparatory activities. For Filaria day activities including supervision, vehicles from other departments/district pool shall also be obtained along with services of other officials through District Magistrate. POL provisions are proposed to be met out of NMEP and NFCP budgets by the respective states

5.3. Stationary and other miscellaneous requirements will be met out of regular funds with the State/ District level

6. Monitoring and Supervision

Filaria Control Officer will be primarily responsible for planning, monitoring, implementation and supervision of the mass drug therapy under the supervision and guidance of CMO/Civil Surgeon. State programme officer shall be directly responsible for all activities connected with the implementation of revised strategy. He will be provided guidance and assistance by the respective Regional Directors and Directorate of NMEP.

7. Evaluation

Evaluation of implementation of revised filaria control strategy shall be carried out by Directorate of Health Services and Regional Offices for Health and FW of respective states along with NICD branches mentioned above. Directorate NMEP will be the nodal agency and shall provide standard evaluation parameters and formats to evaluating agencies. In addition to concurrent evaluation, independent assessment teams shall be constituted for annual appraisal from third year onwards

8. **Calender of Activities**

a.	Orientation of State/district level officers by NMEP	by 1st October '97
b	Development & finalisation of microplans by districts	by 12th October '97
c	Identification of manpower/ infrastructure & orientation	by 18th October '97
d.	Development & replication of IEC material & campaign	by 18th October '97
e	Launch of IEC campaign	by 18th October '97
f	I Review of progress by State level (feedback to NMEP)	by 25th October '97.
g.	II Review of progress	by 5th November '97
h	Logistics arrangements - Stocking of drugs at grassroot level, monitoring etc.	by 15th November '97
i.	- Baseline data collection by survey units - Report to NMEP - Family enumeration	by 15th November '97 by 21st November '97 by 21st November '97
j.	III Review of progress	by 23rd November '97
k	Filaria Day	28th November '97
l.	Mopping up day	6th December '97
m	Report compilation and submission to NMEP	21st December '97

A system of weekly progress monitoring upto 20th November '97 and Daily monitoring thereafter has to be adopted for successful implementation.

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Research News

Towards elimination of lymphatic filariasis in India

Pradeep K. Das, Kapa D. Ramaiah, Daniel J. Augustin and Ashok Kumar

The global initiatives to eliminate lymphatic filariasis as a public health problem by the year 2020 have generated a great deal of debate in India, the largest endemic country. This has led to a shift in the focus from control to elimination of the disease. Although the campaign to eliminate filariasis has begun, much more needs to be done. Several recent research studies have provided an insight into various operational issues and prospects of elimination of lymphatic filariasis. In this article, the current scenario, recent research results, logistics and the prospects of eliminating lymphatic filariasis in India will be discussed.

Lymphatic filariasis (LF) remains a significant health problem in India. Approximately 45% of India's one billion population live in known endemic areas[1] and 48 million are infected[2], accounting for 40% of the global LF burden. Although the disease severely undermines the socioeconomic progress of the affected communities[3], until recently, the control of LF, let alone its elimination, has received little attention in India. This might be due to a lack of simple, cost-effective control tools and little understanding of the social and economic consequences of the disease. More than financial constraints, the inherent operational problems associated with various control strategies, such as vector control, multi-dose mass treatment, selective chemotherapy and diethylcarbamazine (DEC)-fortified salt, frustrated the efforts of programme managers. Although these strategies are effective in specific situations, their wider application is not easy. Nevertheless, recent developments such as the generation of evidence for immense economic and social suffering[3], the cost-effective annual single-dose treatment strategies[4,5] and the multi-sectoral initiatives[6] have instilled hope in all concerned. These developments are of great importance to India and provide an opportunity to: (1) protect the entire endemic population, which includes a hitherto unprotected 89% reported by the National Filaria Control Programme (NFCP) in 1995*, and (2) eliminate an age-old scourge. The conducive new treatment strategies and the global initiatives prompted India to begin a campaign towards the elimination of LF.

Reassessment of prevalence of infection

To date, the LF burden estimates have considered only microfilaria (Mf) carriers and cases of chronic disease. However, the immunochromatographic (ICT) card test[7] and the ultrasound image of adult worms[8] indicated infection in a considerable proportion of the amicrofilaraemic and asymptomatic endemic population. Studies in Egypt[9] and India[10] revealed that 17% of the endemic normals exhibit blood antigenemia, an indication of adult worm presence[11]. These results imply that ~68 million of the 400 million endemic normal population in India might also be infected with adult worms, in addition to the 48.11 million people with an apparent infection[2]. Thus, the size of the infected population could be as high as ~116 million or 26% of the endemic population. Therefore, mass treatment to eliminate LF (Ref. 5) will benefit a large proportion of the population because amicrofilaraemic people with adult worms also display dilated lymphatic vessels, a symptom of LF (Ref. 8).

Recent initiatives

In the past five years, several steps have been initiated in India to move from control to elimination of LF. The most important of these steps is the introduction of annual single-dose mass treatment[5] with the traditional drug DEC, in 11 districts with a population of 32 million across six states. The logistics, feasibility and effectiveness of the strategy are being studied by the NFCP, and the strategy is likely to be expanded in a phased manner. The southern state of Tamil Nadu launched a fully pledged LF elimination programme in 1996 in all 12 endemic districts. Under this programme, DEC is being distributed annually by the health personnel from all 634 Primary Health Centres (PHCs) to 26 million people living in 17 000 villages. Evaluation of the programme from a sample of three urban areas and 50 rural villages across three districts revealed that the PHC network distributed DEC in 98% of the villages and to 75% of the rural population[12] (Table 1). The drug distribution was found to be less effective in urban areas[12] (Table 1), where the personnel from the urban health services implemented the programme. Nevertheless, the Tamil Nadu programme has provided some insights[12] into the prospects of country-wide DEC distribution including: (1) that the distribution of DEC to the entire rural population is possible through the PHC network; (2) an annual single-dose of DEC is acceptable to people; (3) specific socioeconomic factors, manpower shortage and the lack of an effective Information, Education and Communication (IEC) campaign regarding the programme restrict drug distribution (Table 2); and (4) behavioural and drug-related factors (Table 2), and poorly perceived benefits in the population as a result of a lack of an apparent and immediate effect of treatment limit the treatment compliance to much below 80%, which is viewed as an optimum level. There are plans to extend the elimination programme to 100 districts over the next five years. Such efforts are being complemented with the introduction of albendazole, which yields 'beyond-filariasis benefits' including enhanced nutritional benefits and effects on intestinal helminth infections and other parasites[13]. Results from a pilot study involved in distributing albendazole and DEC to seven districts in two states will soon indicate the acceptability and impact of the two-drug regimen in treated communities. These results will assist in extending the treatment regimen to other districts.

Research

Preparations for the LF elimination campaign are well supported by several new research initiatives. Socioeconomic studies showed that the annual economic

*Sharma, R.S. *et al.*, eds (1995) National Filaria Control Programme, India. Operational Manual. The Directorate, National Malaria Eradication Programme, Delhi, India 110054.

http://parasites.trends.com 1471-4922/01/$ – see front matter PII: S1471-4922(01)02056-6

Table 1. Results of evaluation of annual single dose DEC mass treatment in Tamil Nadu state in India[a]

	Rural areas	Urban areas
Number of communities sampled	50	3
Number of households sampled	996	300
Number of people in sampled households	4928	1554
Percentage of households that received DEC	80.4 (801/996)	57.0 (171/300)
Percentage of people who received DEC	75.3 (3713/4928)	53.1 (825/1554)
Percentage of people who consumed DEC	59.3 (2924/4928)	35.2 (547/1554)
Percentage of people who received but failed to consume DEC	21.2 (789/3713)	33.7 (278/825)

[a]Abbreviation: DEC, diethylcarbamazine.

Table 2. Important reasons for people not receiving or complying with DEC treatment[a,b]

Reasons for limiting distribution	Reasons for limiting compliance
Incomplete distribution	Poor awareness of the benefits of taking DEC
Temporary migration	Side-effects and adverse reactions
Travel	Too many tablets
Inadequate publicity for the programme	Misplaced drug
Shortage of time or personnel	Forgot to take drug
Inappropriate distribution time	Lacked confidence in drug distributor
Exclusion of some eligible people (e.g. elderly people, lactating mothers and some children)	Feeling healthy and not in need of drug

[a]Abbreviation: DEC, diethylcarbamazine.
[b]Data obtained from Ref. 12

loss caused by LF is close to a billion US dollars[3], and that there is tremendous hardship in adults and children[14,15]. These data highlighted the significant public health importance of LF and low cost–benefit ratio of the elimination programme[3]. Prevalence and distribution data provided by the NFCP are available for at least some urban areas[16], but are very scanty for the rural areas. A questionnaire has been developed for the rural areas to assess this problem at village level through well-informed community members[17]. A preliminary filariasis map of India with district level endemicity has been prepared and recently published[16]. This map highlights the Gangetic plain in northern-central India and the coastal belt as the hard core endemic foci: 55% of the 466 surveyed districts are endemic and 27% of these districts are at a relatively high endemicity level[16] with a >10% microfilaraemia prevalence rate.

Following clinical trials on the efficacy of the single-dose treatment with DEC or ivermectin alone[4,5] or in combination[5], community-based studies have been launched to evaluate the impact of repeated annual treatment on mirofilaraemia prevalence and transmission[18].

The results from these studies provide some clues to the prospects of LF elimination (Box 1). The epidemiology of LF has been modelled using a simulation programme, LYMFASIM (Ref. 19). The user-friendly model has predicted the effects of vector control satisfactorily and is being further developed to facilitate predictions on the effect of mass-treatment-based control and elimination programmes.

To develop an effective and sustainable drug delivery mechanism, a community-directed treatment approach (in which communities alone decide the timing and duration of drug distribution), the mainstay of onchocerciasis control in Africa, was tested in rural communities of Tamil Nadu and was found to be less acceptable. The health services were able to distribute DEC to 74% of the population and the community leaders distributed DEC to only 68% of the population. Qualitative data strongly indicated the people's preference for drug distribution through the health services rather than through community leaders[20]. Possible solutions to well-recognized operational problems such as the poor treatment compliance rate (35%) in urban areas are being studied and implemented. These solutions include the substitution of the currently used 50-mg tablet formulation with 100-mg, 200-mg or 300-mg tablets to minimize the number of tablets per person, distribution of the drug at appropriate times and mobilization of additional manpower and IEC back-up to the programme[12].

Country-wide elimination

An estimated 450 million people living in 257 districts across 18 states and Union territories are at risk from infection. However, three relatively less-developed states (Uttar Pradesh, Bihar and Andhra Pradesh) alone account for 52% of the endemic population and 62% of the infected population (data provided by NFCP). Concerted efforts are needed to introduce the programme to these states. A nationwide elimination programme requires the distribution of DEC to ~82 million households in 300 000 villages and 1450 urban agglomerations. At the rate of three drug distributors per village (mean population size of 1500), the programme needs a million drug distributors. The PHC network and the urban health services can only provide one drug distributor per 1000 people, which is only half of the requirement of two drug distributors per 1000 people. Therefore, the support of village-level government staff and volunteers is crucial for the success of the programme. Distribution of DEC at the dose of 6 mg kg^{-1} per person requires 2500 of 100-mg tablets, or 5000 of 50-mg tablets per 1000 people. For the entire endemic population, ~1.1 billion of 100-mg tablets or 2.2 billion of 50-mg tablets are required. The current drug production capacity is approximately a third of the total requirement and therefore drug production needs scaling up with assured quality. The per capita cost of the annual DEC mass treatment programme has been estimated at Rs 1.32 ($US 0.028)[21]. This cost might rise to Rs 2.00 ($US 0.043) because programme managers and researchers believe that to introduce and sustain an intense IEC campaign, a higher financial input is required. In addition, the health workers and other drug distributors might have to be paid incentives to enlist their full support to the programme. At the per capita cost of Rs. 2.00 ($US 0.043), a country-wide programme could amount to Rs 900 million ($US 19 million). The experience in Tamil Nadu demonstrated that it is possible for programme managers to convince the central and state governments to bear the

Box 1. Impact of repeated annual diethylcarbamazine mass treatment

The principal strategy planned to eliminate lymphatic filariasis (LF) is to interrupt transmission of infection for four to six years, which is equivalent to the fecundic life-span of the parasite[a,b]. Clinical trials[c,d] have demonstrated that single-dose treatment significantly suppresses blood microfilaraemia and similar results are also expected at the community level. It is postulated that four to six cycles of annual treatment and interruption in transmission might facilitate elimination of LF. A six-year study demonstrated that four cycles of annual single-dose treatment with diethylcarbamazine (DEC), the predominantly used drug in India, significantly reduced the prevalence and geometric mean intensity (GMI) of microfilaraemia and the transmission of infection[e] (Fig. I). By the end of the first year following the fifth cycle of DEC treatment, the microfilaria (Mf) prevalence declined from 13.2% to 3.0% (equivalent to 77% reduction), and the GMI decreased by 89% (from 0.66 to 0.07). The biting-mosquito population based mean monthly transmission potential (MTP) fell by 93% and the resting-mosquito population based transmission intensity index (TII) also decreased by 74% (P.K. Das, unpublished). These appreciable reductions occurred even when the treatment compliance rate ranged between 54% and 75% of the eligible population (with >15 kg body weight) (equivalent to 48–66% of the total population) and when 15% received only one of the five annual treatments. Therefore, an improvement in the treatment compliance rate with five to six rounds of treatment might reduce the GMI of Mf and transmission of infection beyond 89% and 74%–93%, respectively.

Now is the time to address the issue of dynamics and the management of residual microfilaraemia because the disease can show resurgence, even after a decade following a successful control campaign[f]. The application of antigenemia detection tests in communities might throw light on parasite dynamics in humans and the prospects of eliminating LF using five or more rounds of treatment.

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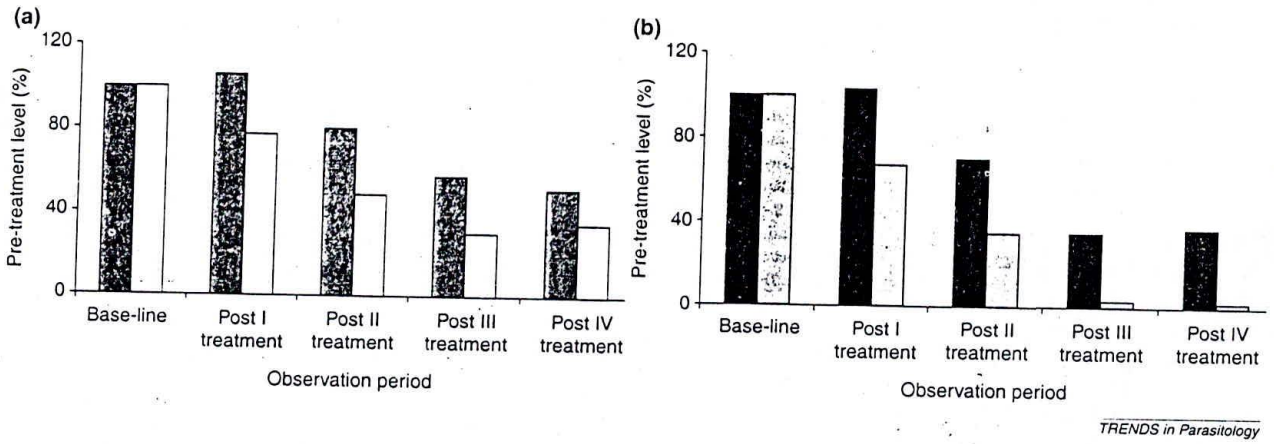

Fig. I. The impact of four rounds of diethylcarbamazine (DEC) treatment on microfilaraemia prevalence (blue bars) and geometric mean intensity (GMI) (white bars) (a). The impact of four rounds of DEC treatment on transmission intensity index (TII) (red bars) and on the monthly transmission potential (MTP) (green bars) is presented in (b). Six months following the first round of treatment, the second round of treatment, and subsequent rounds of treatment were given at one-year intervals. Data obtained from Ref. e.

essential costs of the programme that include cost of drugs, transport and training. However, the mobilization of more funds and materials from non-governmental organizations and other donors are required for the IEC campaign and for incidental expenditure during the drug distribution programme.

Future perspective

The research outcomes suggest that the logistical and operational[12] aspects, and parasite dynamics in humans in relation to the number of annual treatments[18] will have significant implications for the LF elimination programme. Although the economic burden estimates[3] and distribution maps[16] are being used to gather the support of the policy makers (i.e. the fund providers), the logistical and operational[12] aspects suggest that a nationwide programme requires a tremendous effort. The abilities and presence of an extensive PHC network, and a well-established NFCP indicate that country-wide DEC distribution for LF elimination is possible. However, the dimension of the problem[1,2,16], low treatment compliance rates and the lack of knowledge by the people and their poor interest in treatment[12] are serious obstacles that need to be tackled on a priority basis. Because of the extent of the LF problem[1,2,16] and lengthy decision making process, further steps should be initiated soon to: (1) plan and

systematically extend the DEC distribution to the entire country within a timeframe; (2) generate resources; (3) involve the health sector more actively; and (4) educate the communities about the programme to accomplish elimination of LF by 2020 (Ref. 6).

Poor treatment compliance rates[12] and the persistence of microfilaraemia after four to five rounds of treatment (Box 1) necessitates rethinking on the adequacy of four to six rounds of treatment, which is believed to be sufficient for eliminating LF. These factors need to be modelled by LYMFASIM (Ref. 19) to predict the epidemiological trends and duration of the elimination campaign, information that is imperative for programme managers and funding agencies. Although the annual single-dose treatment is the best option at present, the search for better tools such as new treatment regimens and more effective adulticidal drugs should continue.

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509

Cost of mass annual single dose diethylcarbamazine distribution for the large scale control of lymphatic filariasis

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Economic analysis of the revised strategy to control lymphatic filariasis with mass annual single dose diethylcarbamazine (DEC) at 6 mg/kg body weight launched in one of the districts of Tamil Nadu in 1996 was carried out. This exploratory study, proposed for five years in 13 districts under 7 states on a pilot scale through the Department of Public Health is an additional input of the existing National Filaria Control Programme in India. A retrospective costing exercise was undertaken systematically from the provider's perspective following the completion of the first round of drug distribution. The major activities and cost components were identified and itemized cost menu was prepared to estimate the direct (financial) and indirect (opportunity) cost related to the implementation of the Programme. The total financial cost of this Programme to cover 22.7 lakh population in the district was Rs. 22.05 lakhs. The opportunity cost of labour and capital investment was calculated to be Rs. 7.98 lakhs. The total per capita cost was Rs. 1.32, with Rs. 0.97 and Rs. 0.35 as financial and opportunity cost respectively. Based on these estimates, the implementation cost of the Programme at Primary Health Centre (PHC) level was calculated and projected for five years. The additional financial cost for the existing health care system is estimated to be Rs.27,800 per PHC every year. DEC tablets (50 mg) was the major cost component and sensitivity analysis showed that the cost of the Programme could be minimized by 20 per cent by switching over to 100 mg tablets. The analysis indicates that this Programme is a low-cost option and the results are discussed in view of its operational feasibility and epidemiological impact.

Key words Costing - financial and opportunity costs - lymphatic filariasis - mass annual single dose DEC - PHC

It is essential to consider both operational and economic feasibility of any intervention to control parasitic diseases apart from its effectiveness so as to make decisions more rationally. Health care sector in developing countries is constrained by limited resources and it is difficult to implement all possible worthwhile interventions. Still, considerable resources are allocated towards prevention and control of diseases in many developing countries in view of their significant contribution to disease burden[1]. Economic evaluation techniques to assess health care interventions have been standardized in recent years and are used to identify cost-effective options to control parasitic diseases[2-4]. However, their application in lymphatic filariasis is limited and consequently information on the costs of control strategies under operational settings are scanty[5-7].

Lymphatic filariasis is considered as the second leading cause of permanent and long-term disability[8] world-wide. India alone contributes about 40 per cent of the global disease burden due to filariasis[9, 10] and the

National Filaria Control Programme (NFCP) initiated in 1955, covers only 46 million people essentially in urban areas[11]. Antilarval measures and case detection cum treatment of microfilaria carriers are the two methods adopted to control filariasis in these areas. A revised strategy using mass annual single dose diethylcarbamazine (DEC) distribution[12] had been launched on a pilot scale by the NFCP in 1996 as National Filariasis Day (NFD) programme. As an exploratory approach, the operational feasibility of this Programme through the existing health care system is being assessed in 13 identified districts in 7 states following its implementation. However, the extension of this Programme requires information on not only operational feasibility but also its cost and effectiveness. In an effort to provide information on cost-effectiveness, we determined the cost of the Programme by examining retrospectively the financial and opportunity costs from Cuddalore district in Tamil Nadu following the completion of the first round of drug distribution. Cost projections were also made for the implementation of the Programme at Primary Health Centre (PHC) level. The results of sensitivity analysis were used to provide guidelines for cost saving in programme implementation.

Material & Methods

Mass annual single dose DEC distribution, integrated with the existing primary health care system was initiated in 1996 in selected endemic districts. The National Institute of Communicable Diseases (NICD), Delhi and National Malaria Eradication Programme (NMEP) are the nodal agencies responsible for procurement of drugs and developing strategy for information, education and communication (IEC) including arrangements of necessary funds for the same. The Directorate of Public Health and Preventive Medicine, Government of Tamil Nadu and Vector Control Research Centre, Pondicherry are the state level nodal agencies of the programme in Tamil Nadu. The Deputy Director of Health Services is looking after the Programme at the district level. Medical Officers of the PHCs through their public health staff are involved in actual implementation of NFD programme. A committee of independent experts has been identified for monitoring and evaluation of the programme. Planning, preparation and implementation are the different phases of this programme. The key activities encompassed by this intervention included planning, sensitization, family enumeration, drug distribution and supervision. An age related dosage schedule is followed with 50mg for age class 1-2 yr, 100 mg for 2+ to 4, 150 mg for 4+ to 8, 200 mg for 8+ to 11, 250 mg for 11+ to 14 and 300 mg for more than 14 yr of age. Pregnant women, infants and chronically sick individuals are exempted.

Study area : Among the 13 districts selected, this pilot programme could be launched only in Cuddalore district in Tamil Nadu during the first year. All data related to costing were from Cuddalore district following the first round of drug distribution which was carried out between August 4-7, 1996. The population of this district is 22,69,477 (as per family enumeration prior to drug distribution). Male to female ratio is 1:0.98. Only about half of the population had formal education. The total surface area is about 4,283 km^2 with a population density of 530/km^2. About 5.3 lakhs population is living in urban areas, which include five municipalities and 16 town panchayats. There are 1,518 villages governed by 13 administrative blocks with a rural population of 17.4 lakhs. Health care facilities are extended to the urban and semi-urban population through 27 Government Hospitals and 16 dispensaries. A network of 51 PHCs with 319 Health Subcentres (HSCs) is pro viding health care to the rural population. Delimitation surveys conducted during 1955-59 under the NFCP had shown that the prevalence of microfilaraemia ranged from 3.0 to 15.7 per cent in different localities of this district (erstwhile Southarcot district)[13]. It was relatively higher in urban areas (12.9%) than in rural areas (5.4%). The overall microfilaria (mf) and disease rates were 8.38 and 2.62 per cent respectively[14]. Subsequent surveys during 1988-89 (NFCP unpublished data) showed the persistence of filariasis with mf prevalence ranging from 2.50 to 10.06 in different areas of this district.

Assessment of cost: Functional organization of the NFD programme was used as the basis for identification and distribution of cost components. The present costing exercise[15,16] considers the resource inputs from provider's perspective only. District was the level of costing as the entire district was covered under this

Programme and all activities as well as resources were channeled vertically from the district headquarters. Itemized cost menu[17] was used to determine direct (financial) and indirect (opportunity) costs. Identification of component items, recognition of the units of each item and derivation of a cost profile in relation to various input and activity categories were the main approaches followed. Actual cost incurred under different inputs of the Programme was used to determine unit cost. Actual number of vehicles used and the distance covered were used to assess the cost on transport. A unit cost of Rs. 1.95/km, including Rs.1.15 for fuel and Rs.0.80 for maintenance, was used to calculate running cost on transport.

The opportunity cost of the diverted services of personnel was calculated using official wage rates. The time allocated by different personnel for programme implementation was used to assess the total cost on labour. Vehicle was the only capital item used for this programme, the economic cost of which was calculated by annualization factor[18] using current market rate. Annual economic cost of the vehicle was converted into cost per kilometer run, considering the life span of the vehicle in terms of fixed target distance to cover (2 lakhs km).

Evaluation of mass DEC programme is being carried out in this district both for its process and impact. Process indicators such as coverage, compliance, side reactions and record keeping are being monitored. Effectiveness indicators such as microfilaria prevalence and intensity are also monitored for impact assessment. Present analysis on impact assessment for effectiveness was restricted to data from 28 villages, 3 town panchayats and 2 municipal towns for want of parallel data from the rest of the areas.

Based on district level costing, cost at PHC level was estimated and presented in 1996 price. Estimates were made by assuming a population of 25,000 covered by 5 HSCs, eligible population of 97 per cent and total coverage of eligible population. The time allocation for drug distribution was assumed to be five days while for the rest of activities one day each. As all the PHC staff will be engaged in actual drug distribution only the Medical Officer will be left for supervision. Market rate of Rs.0.20/50mg DEC tablet was used as unit cost on drug. Actual requirement of drug was calculated separately for 50 and 100 mg and combination using the general distribution pattern of different age classes from the census record with additional 10 per cent on wastage and overhead expenditure. The average distance of HSC from the PHC was assumed to be 10 km.

Sensitivity analysis was carried out for cost minimization. Drug price was the only parameter with uncertainty in relation to the strength of the drug (50 mg/100 mg) and a unit cost of Rs.0.31 per 100 mg DEC tablet was used for comparison. Cost saving by switching over from 50 to 100 mg was determined by using sensitivity analysis. Cost projection for five years was also done using present value calculation on future cost for subsequent rounds of mass drug distribution at annual discount rate of 5 per cent[4]. The per capita cost derived from this analysis was used to estimate total cost of this Programme at the national level to cover the entire population at risk. The per capita cost reported from earlier studies was converted into present value (1996) and the cost per 1 per cent reduction of microfilaraemia was used as cost-effectiveness ratio for comparison.

Results

Information on age-specific population, drug requirement and coverage achieved in rural and urban areas are given in Table I. The coverage in drug distribution (excluding infants) reported by the drug distributors ranged between 80.9 and 99.4 per cent in different PHCs with an average of 92.07 per cent. In urban areas the coverage was 92.39 per cent, ranging from 77.95 to 98.97 per cent in different towns. The coverage was relatively higher in urban areas when

Table I. Population, drug distributed and reported coverage in rural and urban areas of Cuddalore district

	Rural	Urban	Total
Total population	1735602	533875	2269477
Eligible population	1700890	1690213	3391103
DEC (50mg) distributed	8284548	2577977	10862525
Population covered	1597897	493251	2091148
Coverage (%)	92.07	92.39	92.14

compared to rural areas. As many as 1,08,62,525 DEC tablets were distributed covering a population of 20,91,148 (92.14%). The proportion of population considered as not eligible (infants, pregnant women and sick persons) was 2.02 per cent.

The coverage (the percentage of people contacted) and compliance (the percentage of people who actually consumed the drug of those who were contacted) were also assessed through sample surveys using pre-tested questionnaire in 30 PHCs covering 3,936 individuals by external agencies following the second round. The proportion of people reported to have consumed DEC under direct supervision was 26.55 per cent. The estimated coverage was 90.04 per cent and compliance was 82.13 per cent. Among those who did not take the drug, about 27 per cent reported that they were not present at the time of drug distribution and 5 per cent did not receive the drug from the family members with whom the drug was left. Perceived side reactions was reported by 22.08 per cent of the respondents. On classification it was found that most of the side reactions were non-specific which included giddiness (53.59%), vomiting (10.69%) and nausea (1.40%). Side reactions, considered specific to infection were fever (14.49%) and headache (19.83%).

A series of meetings was held at the district headquarters to plan various activities of the programme. Sensitization was carried out using various IEC tools (Table II). These IEC tools were designed at the Directorate of Public Health and the materials were supplied to district headquarters. Health personnel, staff from other government sectors (Table III) and NGOs were involved in sensitization. Orientation camp for medical officers was held at district level in carrying out this awareness programme. Village health nurses in their respective areas, over five days carried out enumeration of household members in the family register. As many as 2,552 personnel from health and other departments were engaged in drug distribution. There were 1,276 teams, each with one provider and one assistant. During the first round of DEC distribution, the entire population was covered in two days and therefore the total person days required was 5,104. Students were treated in their respective schools while the rest of the population by door-to-door visits. Medical officers of the respective PHC area did the supervision. Vehicles from the Public Health Department were engaged and the total distance travelled was 47,659 km for different activities of this Programme. Process evaluation showed that all the villages and towns were covered and record keeping by the PHC staff was good in terms of proper entries of new additions of population and administration of correct dosages. This shows the commitment and competence of the health personnel in drug distribution. Cross sectional parasitological

Table II. Itemised cost menu and direct financial cost (Rs) by inputs and activity at district level

Category	Cost item	Unit of measure	Unit cost	Activity										Total cost
				Planning		Sensitization		Enumeration		Drug distribution		Supervision		
				Units	Cost	Units	Cost	Units	Cost	Units	Cost	Units	Cost	
Transport														
	Running cost	km	1.95	3659	7135.05	8000	15600.00	0	0.00	24000	46800.00	12000	23400.00	92935.05
Supplies														
	DEC tablets (50mg)	Per tablet	0.18	0	0.00	0	0.00	0	0.00	10900000	1962000.00	0	0.00	1962000.00
	Posters	Piece	5.57	0	0.00	4400	24508.00	0	0.00	0	0.00	0	0.00	24508.00
	Wall stencils	Piece	100.00	0	0.00	100	10000.00	0	0.00	0	0.00	0	0.00	10000.00
	Rubber stamp	Piece	40.00	0	0.00	100	4000.00	0	0.00	0	0.00	0	0.00	4000.00
	Cine slide	Piece	75.00	0	0.00	150	11250.00	0	0.00	0	0.00	0	0.00	11250.00
	Banner	Piece	75.00	0	0.00	100	7500.00	0	0.00	0	0.00	0	0.00	7500.00
	Pamphlet	Piece	0.20	0	0.00	112500	22500.00	0	0.00	0	0.00	0	0.00	22500.00
	Registers	Piece	10.00	0	0.00	0	0.00	5500	55000.00	0	0.00	0	0.00	55000.00
	Placards	Piece	6.00	0	0.00	400	2400.00	0	0.00	0	0.00	0	0.00	2400.00
	Filaria model	Piece	500.00	0	0.00	2	1000.00	0	0.00	0	0.00	0	0.00	1000.00
	Stickers	Piece	3.00	0	0.00	4000	12000.00	0	0.00	0	0.00	0	0.00	12000.00
Total					7135.05		110758.00		55000.00		2008800.00		23400.00	2205093.05
% out of total					0.32		5.02		2.49		91.10		1.06	

Table III. Opportunity cost (Rs) of personnel and capital of the Programme at District level

Category	Cost item	Unit of measure	Unit cost	Activity										Total cost
				Planning		Sensitization		Enumeration		Drug distribution		Supervision		
				Units	Cost	Units	Cost	Units	Cost	Units	Cost	Units	Cost	
Capital														
	Vehicle	km	2.25	3659	8232.75	8000	18000.00	0	0.00	24000	54000.00	12000	27000.00	107232.75
Recurring														
	Personnel													
	Dy.Director of Health Services	per day	300	10	3000.00	5	1500.00	0	0.00	0	0.00	2	600.00	5100.00
	District Malaria Officer	per day	200	15	3000.00	5	1000.00	0	0.00	0	0.00	2	400.00	4400.00
	Filaria Officer	per day	242	17	4114.00	3	726.00	0	0.00	0	0.00	2	484.00	5324.00
	Medical Officer	per day	265	102	27030.00	51	13515.00	0	0.00	0	0.00	102	27030.00	67575.00
	Health Supervisors	per day	200	0	0.00	89	17800.00	0	0.00	178	35600.00	0	0.00	53400.00
	Health Inspectors	per day	200	0	0.00	178	35600.00	0	0.00	356	71200.00	0	0.00	106800.00
	Village Health Nurses	per day	123	0	0.00	319	39237.00	1595	196185.00	638	78474.00	0	0.00	313896.00
	Lab Assistants	per day	142	0	0.00	0	0.00	0	0.00	10	1420.00	0	0.00	1420.00
	Field Assistants	per day	83	0	0.00	0	0.00	0	0.00	30	2490.00	0	0.00	2490.00
	Social Welfare Staff	per day	20	0	0.00	1916	38320.00	0	0.00	3832	76640.00	0	0.00	114960.00
	Drivers	per day	144	0	0.00	20	2880.00	0	0.00	60	8640.00	30	4320.00	15840.00
Total					45376.75		168578.00		196185.00		328464.00		59834.00	798437.75
% out of total					5.68		21.11		24.57		41.14		7.49	

surveys, carried out in selected areas showed 0.32 per cent microfilaria prevalence during the pre control (baseline) period and 0.30 per cent after two rounds of mass drug distribution.

The total resources (financial cost) spent for the implementation of the first round of NFD Programme covering 22.05 lakhs population are summarized as itemized cost menu in Table II. The per capita cost was Rs. 0.97. Among the resource-input categories, supplies were the major cost component, contributing to about 96 per cent of the total cost. Cost on drug (DEC 50 mg) alone was Rs. 19.62 lakhs (89%), the per capita cost on drug being Rs. 0.87. Government vehicles were used to cover a total of 47,659 km and the per capita running cost on transport was Rs.0.04 and the cost on sensitization materials and family enumeration register was Rs.0.06.

Drug distribution was the most expensive activity of the Programme, demanding about 91 per cent of the total financial cost. The remaining cost was shared by sensitization (5.02%), enumeration (2.49%), supervision (1.06%) and planning (0.32%). Drug and transport costs were the only cost component under the functional category of drug distribution.

The opportunity cost on diverted labour and capital input under different activities is shown in Table III, the per capita cost being Rs. 0.35. Cost on personnel was the major cost component (Rs.6.91 lakhs) accounting for about 87 per cent of the total opportunity cost. The share of capital cost on vehicle, which was estimated in relation to distance run (km), was only 13 per cent. Comparison of cost between the activities showed that drug distribution required relatively a higher labour force accounting for about 40 per cent of total opportunity cost. Planning and supervision required allocation of minimum personnel time. The total economic (financial + opportunity) cost of the Programme at district level was Rs.30.04 lakhs with a per capita cost of Rs.1.32.

Estimation of Programme cost at the PHC level with the existing infrastructure showed that the additional cost required for each round of mass drug distribution was Rs.27,824 (Table IV) to cover 24,250 individuals eligible for treatment (97%). The opportunity cost was estimated to be Rs. 16,947 (Table V). When this is extrapolated to cover the entire population of 4,280 lakhs at risk of filarial infection in India, it will require financial allocation of about Rs. 5,365 lakhs for the entire programme, every year. The cost on diverted labour and capital item will amount to Rs.3,267 lakhs. Estimation of present value of future cost of the Programme for subsequent rounds of drug

administration for five years showed that each PHC would require an additional financial allocation of Rs. 1.7 lakhs for this Programme when 50 mg tablets are used.

Sensitivity analysis of drug price showed that switching over from 50 mg tablet to 100 mg could reduce the cost by 20 per cent (Fig.). This will result in saving Rs. 31,400 at PHC level in financial cost for five annual rounds of mass DEC. When combination of 50 and 100 mg is used, cost saving will be about 19 per cent.

Discussion

The burden of filarial disease in terms of disability adjusted life years (DALYs) lost in India has been estimated to be 2.8 and 1.6 lakhs for men and women respectively[1]. Annually about Rs. 12 crores are spent to protect 460 lakh population under the National Programme through anti-larval measures and detection-cum-treatment of microfilaria carriers in urban areas[9,11]. The per capita recurring cost of this Programme is Rs.2.60 per year (estimated cost of Rs. 14.37 for five years). Analysis of costs of current mass annual single dose DEC Programme showed that the per capita cost for five annual rounds would be only Rs. 7.29. This covers the entire operation of the programme including the cost on personnel.

Analysis of the per capita cost of different intervention-strategies of a pilot study[19], carried out between 1966-1975 to control brugian filariasis showed that one round of selective DEC treatment was low cost option (Rs.11.70) when compared to one round of weekly doses of mass DEC treatment for 12 wk (Rs.13.34), 36 rounds of HCH residual spray (Rs.83.34),

Table IV. Estimated financial cost (Rs) for mass drug distribution at PHC level

Category	Cost item	Unit of measure	Unit cost	Activity: Planning Units	Planning Cost	Sensitization Units	Sensitization Cost	Enumeration Units	Enumeration Cost	Drug distribution Units	Drug distribution Cost	Supervision Units	Supervision Cost	Total cost
Transport														
	Running cost	km	1.95	0	0.00	100	195.00	0	0.00	0	0.00	200	390.00	585.00
Supplies														
	DEC tablets (50mg)	per tablet	0.20	0	0.00	0	0.00	0	0.00	126410	25282.00	0	0.00	25282.00
	Posters	piece	5.57	0	0.00	100	557.00	0	0.00	0	0.00	0	0.00	557.00
	Pamphlet	piece	0.20	0	0.00	2000	400.00	0	0.00	0	0.00	0	0.00	400.00
	Registers	piece	10.00	0	0.00	0	0.00	100	1000.00	0	0.00	0	0.00	1000.00
Total					0.00		1152.00		1000.00		25282.00		390.00	27824.00
% out of total							4.14		3.59		90.86		1.40	

Table V. Estimated opportunity cost (Rs) of personnel and capital of the Programme at PHC level

Category	Cost item*	Unit of measure	Unit cost	Activity: Planning Units	Planning Cost	Sensitization Units	Sensitization Cost	Enumeration Units	Enumeration Cost	Drug distribution Units	Drug distribution Cost	Supervision Units	Supervision Cost	Total cost
Capital														
	Vehicle	km	2.25	0	0.00	100	225.00	0	0.00	0	0.00	200	450.00	675.00
Recurring														
	Personnel													
	Medical Officer (1)	per day	265	1	265.00	1	265.00	0	0.00	0	0.00	2	530.00	1060.00
	Health Supervisors (3)	per day	200	3	600.00	3	600.00	0	0.00	15	3000.00	0	0.00	4200.00
	Health Inspectors (1)	per day	200	1	200.00	1	200.00	0	0.00	5	1000.00	0	0.00	1400.00
	Village Health Nurses (5)	per day	123	5	615.00	5	615.00	25	3075.00	25	3075.00	0	0.00	7380.00
	Social Welfare Staff (18)	per day	20	0	0.00	0	0.00	0	0.00	90	1800.00	0	0.00	1800.00
	Drivers (1)	per day	144	0	0.00	1	144.00	0	0.00	0	0.00	2	288.00	432.00
Total					1680		2049.00		3075.00		8875.00		1268.00	16947.00
% out of total					9.91		12.09		18.14		52.37		7.48	

*Figures in parenthesis denote staff position

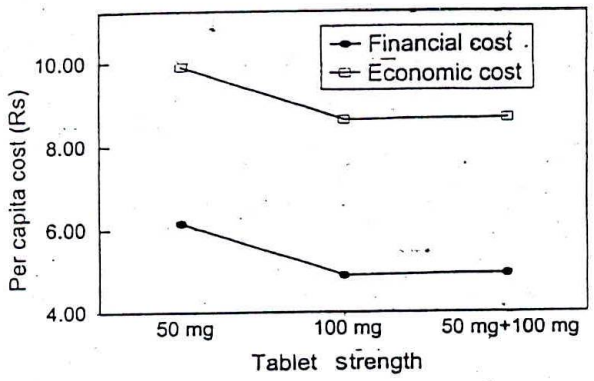

Fig. Projected per capita cost for 5 years in relation to variation in drug price.

its supplementation with selective treatment (Rs. 86.47), and its supplementation with mass chemotherapy (Rs.89.03) . Another study showed that the per capita cost of DEC medicated salt programme to control bancroftian filariasis in Lakshadweep[20] was Rs. 7.43 (present value). The cost to screen an individual for selective DEC treatment was reported to be Rs. 3.00 (present value)[21]. Cost effectiveness analysis of those interventions for which effectiveness data are available shows that the DEC medicated salt programme is more cost effective as the cost (present value) per 1 per cent reduction in microfilaraemia prevalence was the lowest (Rs. 0.09) when compared to the rest. The intervention with 36 rounds of HCH spray was the least cost-effective intervention (Rs. 1.10). However, this analysis has some limitations such as no uniformity in costing and implementation at different points of time. In view of these difficulties, the costing of the present mass single dose DEC programme has been carried out systematically. Though information on effectiveness is available after two rounds of mass treatment, it will be too early to assess the impact of the programme in terms of change in microfilaraemia prevalence. With the revised sampling design in epidemiological evaluation of the programme for impact assessment of this programme, it will be possible to carry out cost effectiveness analysis after subsequent rounds. Yet, mass annual single dose DEC distribution remains to be cheaper with a per capita economic cost of Rs. 1.32 at district level for each round, including the time cost on personnel which accounts for only 27 per cent of the total cost when compared with all other strategies.

Cost saving to an extent of 20 per cent by switching over to 100 mg tablets of DEC can be considered while planning large scale control programmes. Operationally it may be possible to use only 100 mg tablet by giving 1/2 tablet for 50 mg dosage or rounding the dosage to the nearest 100. Palatable syrup may be operationally convenient with high compliance to cover children below five years of age. Considering the cost of syrup (100 ml=Rs.12.65), the additional cost would be only 1.7 per cent of the total cost when tablets are replaced with syrup for the age class 1-4 yr. However, its operational feasibility needs to be assessed.

Estimates of both direct and indirect costs due to filariasis are available for different communities[22]. The estimated number of days lost due to acute attacks of filariasis respectively for *Wuchereria bancrofti* and *Brugia malayi* was 23.4 and 26.5 days[23]. Based on this, the economic loss due to lymphatic filariasis in India was estimated to be Rs.6,300 crores (US$ 1.5 billion) per year[24]. This can be considered as minimum as there appears to be underestimates on costs due to some uncertainties. With the estimated per capita financial cost of Rs. 1.14 at PHC level, the revised strategy would cost Rs.48.79 crores per annum to cover the entire population at risk in India. This is only less than 1 per cent of the annual economic loss due to filariasis. Though this Programme is integrated with the PHC system with no additional resources for personnel, distribution of DEC drug is an added work burden to the existing public health workers. Therefore, the opportunity cost of the diverted services of health personnel to distribute drug to control filariasis should not be neglected while planning large scale control operations.

The efficacy of mass single dose DEC treatment has been studied extensively[9,25-28] and this strategy has been recommended for the control/elimination of filariasis[29]. The present study shows that mass single dose DEC distribution is operationally feasible in terms of good coverage reflecting the commitment of the PHC staff and compliance (community acceptance as the side reactions are minimal). Thus this revised strategy differs from our earlier experience with mass single dose DEC continuously for five days during 1955-60[14] which was abandoned due to poor coverage and precipitation of drug reactions provoking public resistance. Another

study of mass treatment with 12 weekly doses of single dose DEC also showed a very low coverage[30]. Therefore, with a good coverage and compliance with minimal side reactions as observed in the present study, mass annual single dose DEC can be considered operationally feasible and a low cost option for large scale control of lymphatic filariasis in India. The ongoing exploratory study on pilot scale is also expected to resolve some of the issues such as the duration of programme implementation, the level below which the transmission ceases spontaneously and the minimum coverage to be achieved. It is also essential to collect data on various resource inputs utilized for the implementation of the present pilot programme in different operational settings so as to optimize the inputs in maximizing the effectiveness in view of uncertainties in some cost components. The present economic analysis can be used as a guideline for planning and implementing the revised filariasis control strategy with mass annual single dose DEC distribution at different levels.

Acknowledgment

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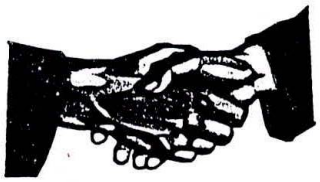
Operational feasibility and impact of co-administration of Albendazole and DEC in controlling lymphatic filariasis

Nodal Agencies

NAMP
Implementation



ICMR
Evaluation

INSTITUTIONS

Vector Control Research Centre

Pondicherry

Tuberculosis Research Centre

Chennai

Regional Medical Research Centre

Bhubaneswar

National Institute of Communicable Diseases

New Delhi

Department of Public Health

Tamil Nadu, Orissa & Kerala

VECTOR CONTROL RESEARCH CENTRE
WHO Collaborating Centre for Research & Training in Integrated Methods of Vector Control
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MESSAGES FOR MANAGERS

India is a signatory to the World Health Assembly resolution towards filariasis elimination (WHA 50.20. 1997). Therefore it is mandatory to extend filariasis control actively to all the endemic areas towards achieving the goal of elimination.

According to the constitution of India, health is a "state" subject. States themselves can take the leadership role in implementing various health programmes. Tamil Nadu is a pioneer in so far as implementing filariasis elimination / control programme is concerned as 12 districts have already been brought under this programme.

Filariasis is the second leading cause of permanent and long-term disability in humans. Disability and morbidity due to this disease result in considerable productivity loss. Therefore filariasis elimination is an essential component of efforts towards poverty alleviation, and requires co-operative involvement of the Government, NGOs and the people at large.

The elimination programme has two strategies: disease transmission control and morbidity control in individual patients afflicted with the disease. Transmission control can be achieved through reducing the parasite load in the community using drugs (such as DEC or DEC plus albendazole) or through appropriate vector control or both. The major difficulty in ensuring the consumption of the drug(s) is the lack of knowledge among the people about the disease. For example, most people are unaware that hydrocele is due to filariasis. People also need to be educated about the possible side reaction of the drug. Morbidity control can be achieved through prevention and treatment of cases.

There are three components in filariasis elimination programme: ***Science, commitment and partnership***. Science or knowledge is not sufficient unless the other two are mobilized.
There are four aspects through which the programme has to proceed.

- Mapping (identifying endemic areas)
- Implementation of intervention strategy
- Monitoring and evaluation
- Certification of elimination

Filariasis elimination can only be achieved through right motivation at all levels in order to implement the programme effectively through partnership approach.

Vector Control Research Centre, a permanent Institute of the Indian Council of Medical Research provides global, national and local technical guidelines to implement and evaluate programmes scientifically and to help train programme personnel.

ICMR Cell towards elimination of filariasis in India
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RESEARCH PROTOCOL

1. **Title of the Research Project:** Operational feasibility and impact of co-administration of albendazole and DEC in controlling lymphatic filariasis.

2. **Name and Designation of Project Co-ordinator:** Dr.P.K.Das, Director, VCRC, Pondicherry

3. **Nodal agencies of the project:**

   a. National Anti-malaria Programme – Dr. Ashok Kumar
   b. Indian Council of Medical Research – Dr.Lalit Kant

4. **Investigators:**

(a) **Investigators from VCRC, Pondicherry:**

Principal Investigator : Dr.S.P.Pani, Deputy Director (Sr. Gr), Vector Control Research Centre, Pondicherry.

Co-Investigators : Dr. D.J. Augustin, Joint Director, Directorate of Public Health and Preventive Medicine, Govt. of Tamil Nadu, Chennai
Dr. K.Krishnamoorthy, Dr. B.Nanda, Dr. Shanti Anathakrishnan, Mrs A.Lakshmi, Vector Control Research Centre, Pondicherry

(b) **Investigators from TRC, Chennai:**

Principal Investigator : Dr .V. Kumaraswami, Deputy Director (Sr. Gr), TRC, Chennai

Co-Investigators : Dr. D.J. Augustin, Joint Director, Directorate of Public Health and Preventive Medicine, Govt. of Tamil Nadu, Chennai

(c) **Investigators from RMRC, Bhubaneswar:**

Principal Investigator : Dr. G.P. Chhotray, Deputy Director (Sr. Gr), RMRC, Bhubaneswar

Co-Investigators : Dr. R.N. Nanda, Director, Health Services, Govt. of Orissa
Dr. S.S.Mahapatra, Asstt. Director, RMRC, Bhubaneswar
Dr. M.R. Ranjit, S.R.O., RMRC, Bhubaneswar

Consultants : Dr. Chittaranjan Pattanayak, Director, Medical Education & Training, Govt. of Orissa
Dr. R.N. Rath, Prof. of Medicine (Retd.)

(d) **~~Investigators from NICD, Delhi:~~** Technical collaboration for Kerala.

Principal Investigator : Dr. R.C.Sharma, NICD, Delhi

Co-Investigators : Dr. S.M. Koya, NICD, Calicut, Kerala
Director of Health Services, Govt. of Kerala

5. Background:

Lymphatic filariasis has been identified as one of the six major tropical diseases that can be potentially eradicable (Ottesen and Ramachandran, 1995). It is the second leading cause of permanent and long-term disability in human (WHO, World Health Report, 1995), in addition to causing social stigmatization, psychosocial and economic burden to individual and community. Consequently, filariasis is one of the diseases that cause poverty. Therefore, elimination of filariasis is linked with poverty alleviation.

India is a signatory to the WHA (1997) resolution on lymphatic filariasis elimination where about 412 million people are at the risk of this infection. Towards meeting this goal, mass annual single dose DEC treatment is being carried out on a pilot scale in 13 districts in India. Experience during the last three rounds of drug distribution showed that even though the coverage was reported to be above 90%, the compliance (drug consumption) was estimated to be below 60%. Mathematical model predictions suggest that with this level of compliance 5-6 rounds of mass treatment will not be sufficient to achieve zero probability of infection. Therefore, it is essential to enhance community compliance.

Community compliance can be improved if the community perceives the benefit. Co-administration of albendazole could be a potential proposition by which community compliance can be enhanced through perceived benefit. The current study proposes to compare the operational feasibility and impact of co-administration of DEC and albendazole with that of DEC alone at district level. It is also proposed to develop a monitoring and evaluation strategy for large-scale control of filariasis.

This multicentric study will be carried out in Tamil Nadu, Orissa and Kerala. Research institutes such as VCRC and TRC will be involved in Tamil Nadu, RMRC in Orissa and NICD in Kerala for evaluation and providing technical support.

The findings and recommendations will be useful in developing national strategic plan for large-scale control of lymphatic filariasis, moving towards the ultimate goal of filariasis elimination.

6. Duration of Research Project: 5 years (2000-2005)

7. Research institutions responsible for programme evaluation and co-ordination (please also see Table 1 on page 5)

a. ***Vector Control Research Centre***
(Indian Council of Medical Research)
Medical Complex, Indira Nagar
PONDICHERRY – 605 006

b. ***Tuberculosis Research Centre***
(Indian Council of Medical Research)
Spur Tank Road, Chetput, Chennai – 600 031

c. ***Regional Medical Research Centre***
(Indian Council of Medical Research)
Chandrasekharpur
Bhubaneswar – 751 023
Orissa

d. ***National Institute of Communicable diseases***
New Delhi

8. Objectives:

1. Compare mass annual single dose DEC alone with co-administration of albendazole and DEC for filariasis control/elimination - district as a unit with reference to:

    - Coverage
    - Compliance
    - Perceived benefit
    - Impact in terms of mf prevalence and intensity, antigenaemia prevalence. transmission and geo-helminth prevalence
    - Adverse reaction, and
    - Cost

2. Training of local health authorities (state and district) for implementation, monitoring and evaluation

9. Hypotheses:

- Co-administration of DEC and albendazole improves community compliance through perceived benefits than DEC administration alone
- Co-administration of DEC and albendazole has better impact than DEC administration alone
- Co-administration of DEC and albendazole is as operationally feasible as administration of DEC alone
- Adverse reactions due to co-administration of DEC and albendazole are similar to administration of DEC alone

9. Present knowledge on control options

More recently it has been demonstrated that combination of albendazole with DEC or ivermectin can effectively clear microfilaraemia of bancroftian infections (WHO, 1998). Single dose co-administration of albendazole with either DEC or Ivermectin is superior in efficacy to single drug treatment for decreasing microfilaraemia in lymphatic filariasis. Albendazole alone has shown to possess killing or sterilizing activity on adult filarial parasite (Denham *et al.*, 1980; Mak *et al.*, 1984). Albendazole plus DEC/ivermectin co-administration offers "beyond filariasis" benefits in terms of comprehensive health development and cognitive function in children. Also, addition of Albendazole to DEC did not appear to

increase the frequency or intensity of adverse events when compared to DEC when given alone (WHO, 1999). However, the usefulness of this approach needs to be evaluated on large scale before it's up scaling to cover the entire population at the risk of filarial infection.

10. Detailed Research Plan:

The two components of the programme include, implementation and evaluation, and the latter includes both process and impact. This study will be carried out in 13 districts, with 8 districts in Tamil Nadu, 3 districts in Orissa and 2 districts in Kerala respectively. The two arms of this study include co-administration of DEC with albendazole and administration of DEC alone. A population of 20.54 million in 9 districts will receive both albendazole and DEC while 9.0 million people in 4 districts will be distributed with DEC alone (Table 1). Comparisons will be made between these two arms using appropriate indicators.

Table 1. District wise population, strategy and institutions responsible for evaluation

Centre	Institution	State	District	Drug	Population (in millions)	Endemicity rate (%)
Bhubaneswar	RMRC	Orissa	Puri #	DEC 50	1.57	10.6
			Balesore	DEC 50+Alb	1.80	4.5
			Ganjam #	DEC 50+Alb	2.90	24.9
Chennai	TRC	Tamil Nadu	Trichy #	DEC 100	2.44	2.7
			Kanchipuram	DEC 100+Alb	2.72	19.3
			Vellore	DEC 100+Alb	3.33	15.7
			Thiruvallur	DEC 100+Alb	2.73	19.2
Pondicherry	VCRC	Tamil Nadu	Thiruvanamalai #	DEC 50	2.19	15.6
			Thanjore #	DEC 50+Alb	2.14	15.9
			Thiruvarur	DEC 100+Alb	1.18	15.9
			Nagapattinam	DEC 100+Alb	1.54	15.9
Delhi	NICD	Kerala	Kozhikode #	DEC 50	2.80	7.1
			Alleppey #	DEC 50+Alb	2.20	21.3
					29.57	

Districts for intensive studies by the research institutions. In other districts the State/district authorities will be trained and monitoring and evaluation will be done by regular supervision.

10.1. Implementation:

National Anti-malaria Programme (NAMP) is the nodal agency for the implementation of mass annual single dose programme. As an active partner, continued involvement is identified as its role in the present trial. NAMP will co-ordinate activities of drug distribution through state level programme managers. (Technical Advisory Group recommendation, 12.9.2000). Department of Public Health, Government of Tamil Nadu, Orissa and Kerala has already launched filariasis control programme using mass annual single dose DEC (6 mg/kg body weight) in 2 districts each. Tamil Nadu has extended this programme to 10 more districts subsequently. Addition of albendazole (400 mg) to the existing single drug (DEC) regimen will be carried out by the Department of Public Health of the respective state Governments. Implementation of this programme will be carried out under the programme mode with active collaboration of the research institutions.

The key activities of programme implementation include, sensitization of providers and partners, preparation of implementation plan, Training, Family enumeration, preparation of community through awareness campaign using appropriate IEC tools, drug distribution through house visits, active surveillance for adverse reaction and passive surveillance for serious adverse experience. An action plan will be prepared with appropriate time schedule for programme implementation.

DEC tablets will be supplied by the NAMP (except for 6 districts in Tamil Nadu for which the State Government will be responsible for drug supply). WHO has supplied the required 20 million albendazole tablets (400 mg) for the first round with a commitment for subsequent rounds at free of cost. No separate fund is requested for the implementation of this programme with two-drug co-administration of albendazole and DEC. This will be carried out with the existing infrastructure with the Department of Public Health of the respective State governments.

10.2. Evaluation:

Being an operational research study, it is aimed to collect information to monitor the progress of both programmatic activities (process evaluation) and overall programme effectiveness (impact evaluation), in addition to providing remedial measures into the problems that arise in programme implementation. Appropriate process and impact indicators will be used to compare operational feasibility, safety, perceived benefits, impact and cost to compare between the interventions. As the programme is implemented at district level, district is considered as evaluation unit. Intensive studies will be carried out in 8 districts, with one district under each arm per evaluating institution (Table 1). Changes in these parameters over a given period of time in relation to base line will also be analyzed. During the first year all the necessary baseline information will be generated.

Coverage, reported by the drug distributor will be used as one of the indicators of implementation process. Details on drug receipt and supply, and coverage of drug distribution will be collected from the drug distributors for all the villages/wards through return forms.

Safety of the drug(s) will be determined from the adverse reactions, which will be assessed through active surveillance and Serious Adverse Experience reports. Active surveillance will be carried out by monitoring 2000 persons in each district covering all PHCs and Municipalities on 5-7 days post intervention, using consumer-monitoring form. Perceived benefit in terms of deworming will also be assessed through this method apart from questionnaire method. These process parameters will be monitored following each round of drug distribution.

Monitoring of population for the rest of the evaluation parameters will be carried out in sentinel sites. This is because lymphatic filariasis is clustered in distribution and monitoring of the entire population in a district is neither feasible nor necessary. Also, the impact can be realized only in areas where the problem exists. Sentinel sites are those sites, which will be monitored through out the evaluation period. However to have a wider representation and to minimize the bias due to possible focus of attention in sentinel sites, equal number of sites will be selected randomly every time i.e. selecting different sites for every subsequent survey as spot check sites.

Rural and urban areas will be treated separately in view of difference in risk factors and health care delivery. Rural population is covered under PHC services and urban population is covered under municipalities. Villages are the subunits of PHC and wards are that of municipalities. Villages/wards are considered as the lowest evaluation sites.

To select sentinel sites (villages/wards), a list of sites that are positive for microfilaria carriers will be prepared. Identification of positive sites will be done rapidly microfilaraemia (mf) prevalence in the peak age class as a proxy indicator. Initial screening for mf will be carried out from 10 villages/wards in 50% of the PHCs and Municipalities selected at random. Villages/wards in each PHC/Municipality will be selected by using cyclic systematic sampling procedure after arranges the sites in ascending order of population. In each village/ward a total of 30 households will be selected using systematic sampling procedure. A cross sectional survey will be carried out by screening all the individuals in the age class 15-30 years for microfilaraemia in the selected households and drawing 20 µl blood following finger prick method between 8.00 PM and 11.00 PM. A village/ward with at least one microfilaria carrier will be considered as positive village/ward. A list of minimum of 50 such positive villages and 10 positive wards will be prepared for selecting sentinel villages/wards. These positive villages will be stratified into 3 categories (low, medium and high) based on mf prevalence in a given district following cluster analysis. From each category, 2 villages will be selected at random as sentinel villages. The rest of the villages will be considered for selecting spot-check villages. From this list, equal number of villages will be selected randomly as spot-check villages while collecting data on different parameters during the pre-intervention survey and subsequent surveys. In the urban area, only two wards that are positive for microfilaraemia will be selected as sentinel wards randomly irrespective of mf rate, with two more positive wards as spot-check wards.

Community acceptance will be assessed using compliance (drug consumption) rate through interviews with semi-structured questionnaire. This will be collected from all the sentinel

villages/wards and from equal number of spot check villages/wards. From each village/ward 20 households will be selected and information will be collected from all the available individuals, in case of children from their parents. This will be monitored following each round of drug distribution.

Impact evaluation will be carried out using outcome indicators such as mf prevalence, mf intensity, antigenaemia prevalence, transmission parameters, and prevalence and intensity of geo-helminths. Base line data on mf prevalence and intensity will be collected from all the sentinel villages and wards. In addition, equal number of spot check villages from each category of positive villages as well as wards will be selected for the survey. A cross sectional survey will be carried out by screening individuals in 10% of the households in each of the selected village/ward for microfilaraemia. Households will be considered as the sampling unit and all the individuals available at the time of the survey will be screened for microfilaraemia using finger prick method and collecting 20 µl blood between 8.00 PM to 11.00 PM. Subsequent surveys will be carried out in all the sentinel and spot-check villages/wards before 2^{nd} , 4^{th} rounds of drug distribution and after 5^{th} round.

Antigenaemia prevalence will be assessed prior to the intervention in all the sentinel and spot check villages/wards, by screening 75 individuals from each village/ward following simple random procedure with 25 from each of the age classes 1-5, 6-10 and 20-25 years respectively using ICT. Post intervention evaluation will be carried out following the same procedure to observe the change in acquisition of antigenaemia, for elimination certification and loss rate in the peak age class. Follow up surveys will be carried out before 4^{th} round and after 5^{th} round of drug administration. A total of 1200 individuals will be screened every time for antigenaemia from each district under intensive studies.

Base line survey on geo-helminths will be carried out from sentinel and spot-check villages/wards by screening at least 25 children in the age class 9-10 years in each village/ward. Kato Katz technique will be followed to assess the prevalence of geo-helminths, species profile and intensity. This cross sectional survey will be repeated every year prior to the drug distribution.

Entomological survey will be carried out by collecting indoor resting vector mosquitoes from all the sentinel villages/wards. Collections will be made at fortnightly interval, by spending 6 man-hours and searching 24 (12 fixed and 12 random) houses for a period of two months during the peak transmission season (November to January). All the collected vector mosquitoes with a maximum of 100 per collection from each village/ward will be dissected for parasite infection. Details on the number dissected, number infected (any stage) and number infective (infective stage larva) along with stage-specific density will be generated. Follow-up collections will be carried out every year prior to each round of drug distribution.

Costing of the programme will be carried out by following itemized cost menu procedure. Cost components, their unit cost and magnitude will be identified and quantified. Both financial cost and opportunity cost towards diverted time will be considered. Cost profile in terms of input and activity category will be prepared and per capita cost of the programme will be determined.

References

1. Ottesen, E.A. and Ramachandran, C.P. Lymphatic filariasis Infection and Disease: Control Strategies. *Parasitology Today*, 1995; **11**:129-31.

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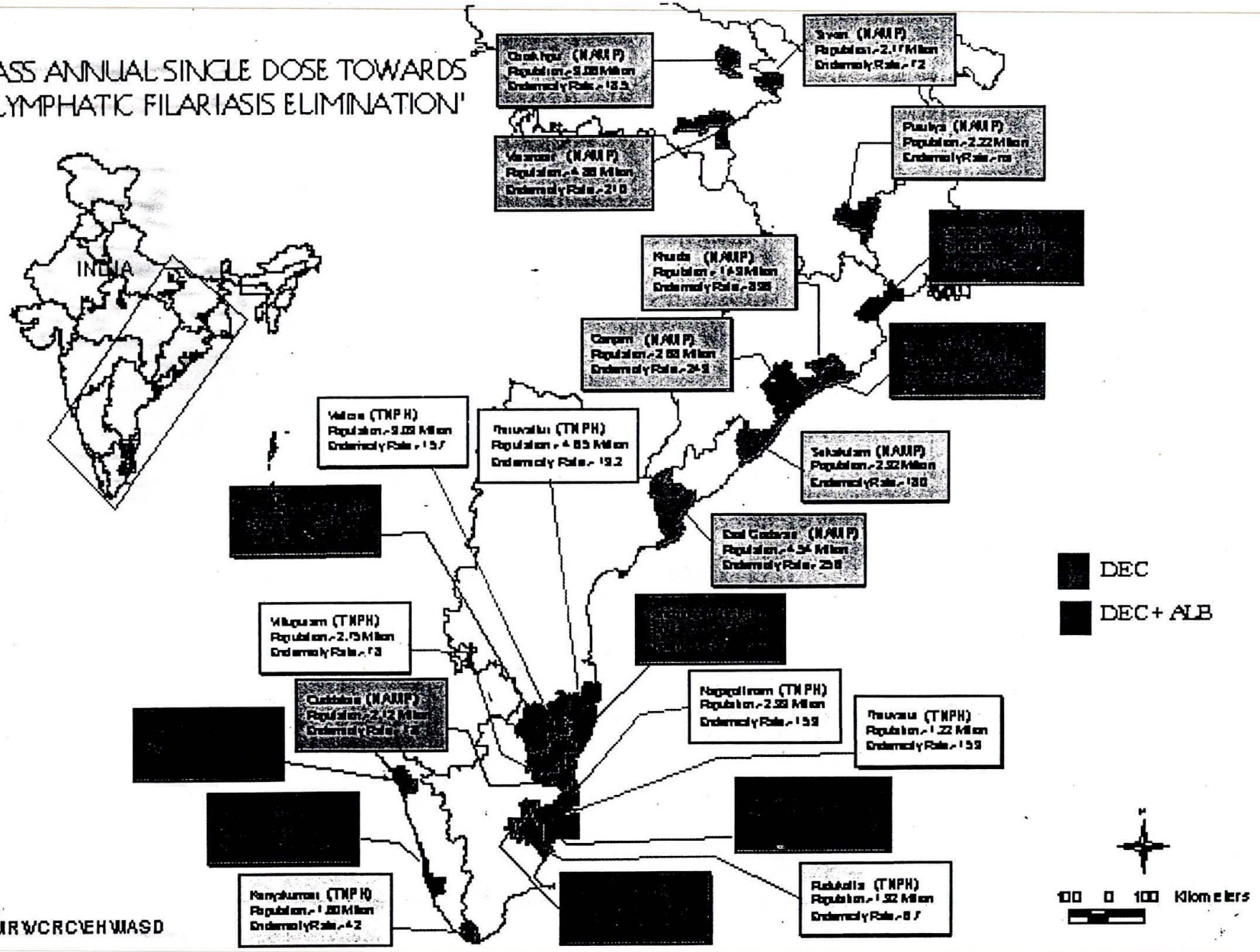
4. Mak JW, Sim BKL, Yen PKF. 1984. Filaricidal effect of albendazole against subperiodic *Brugia malayi* infection in the leaf monkey *Presbytis melalophos. Tropical Biomedicine,* 1: 121-23

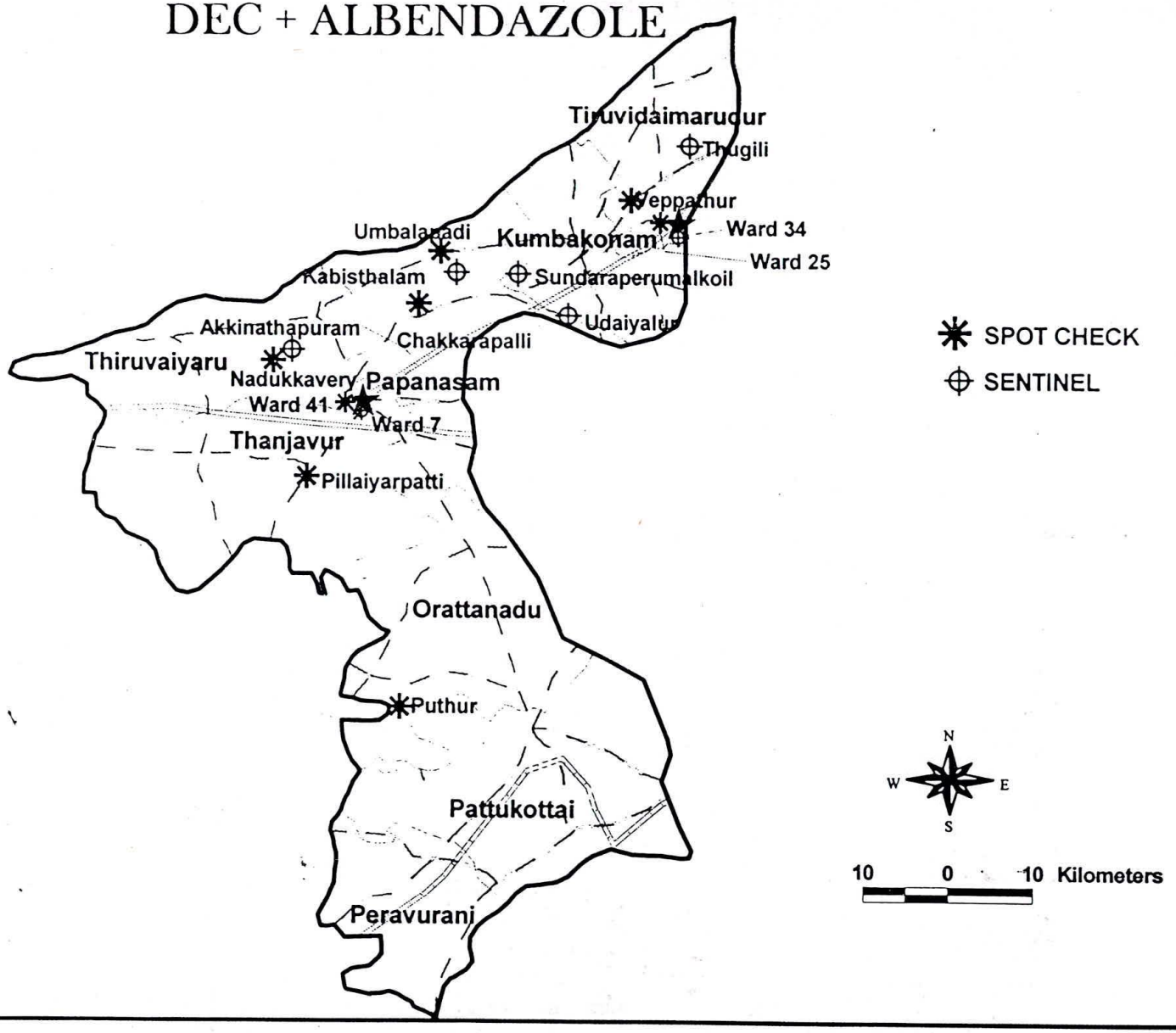
5. Denham DA. 1980. The antihelminthic effects of albendazole on *Brugia pahangi. J Helminthology*, 54:199-200

MASS ANNUAL SINGLE DOSE TOWARDS 'LYMPHATIC FILARIASIS ELIMINATION'



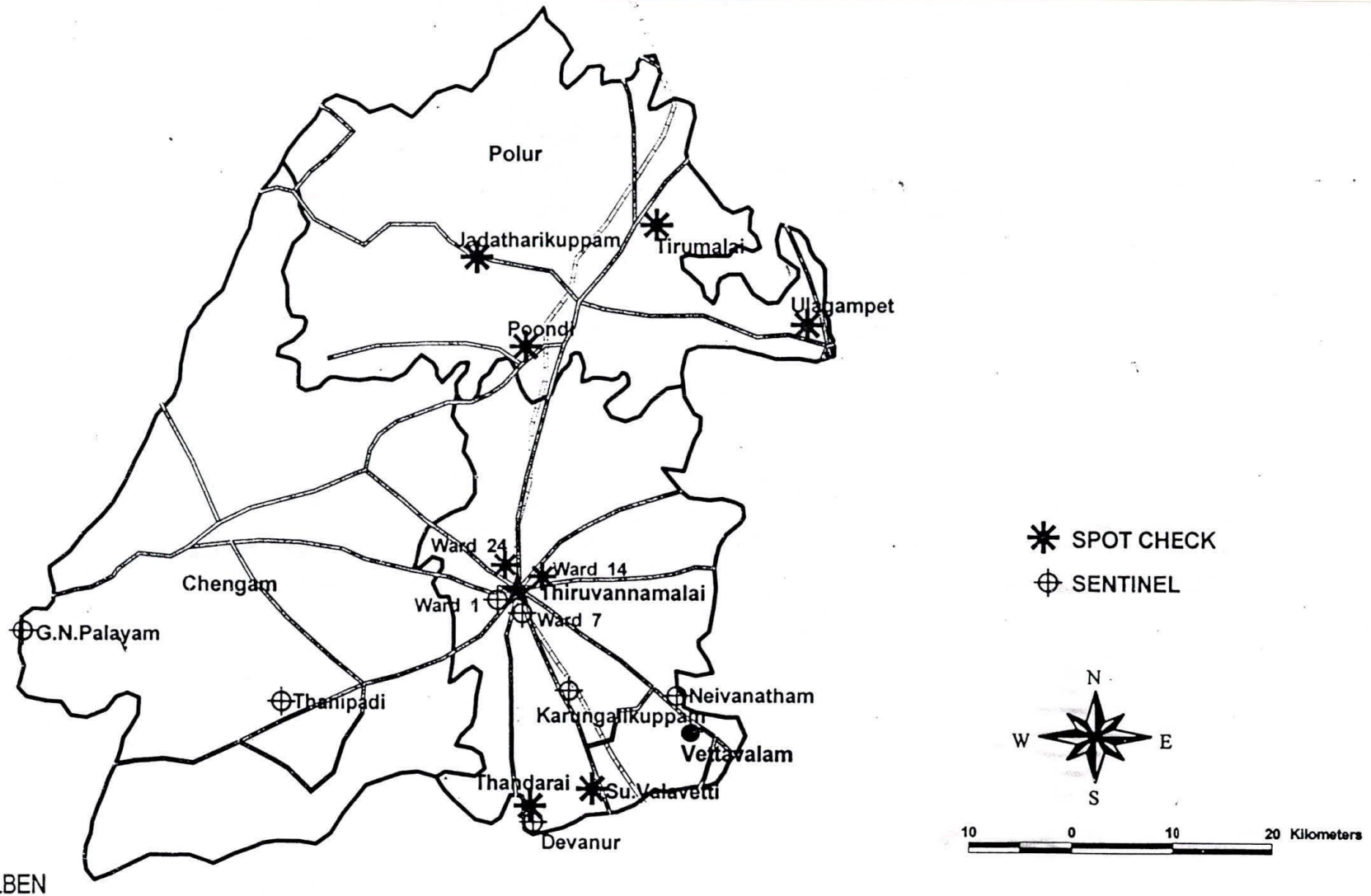
ICMR/VCRC/EHWASD

Tanjore District - Mass Annual Single Dose
DEC + ALBENDAZOLE



ICMR\VCRC\EH\ALBEN

Thiruvannamalai Health Unit
Mass Annual Single Dose - DEC



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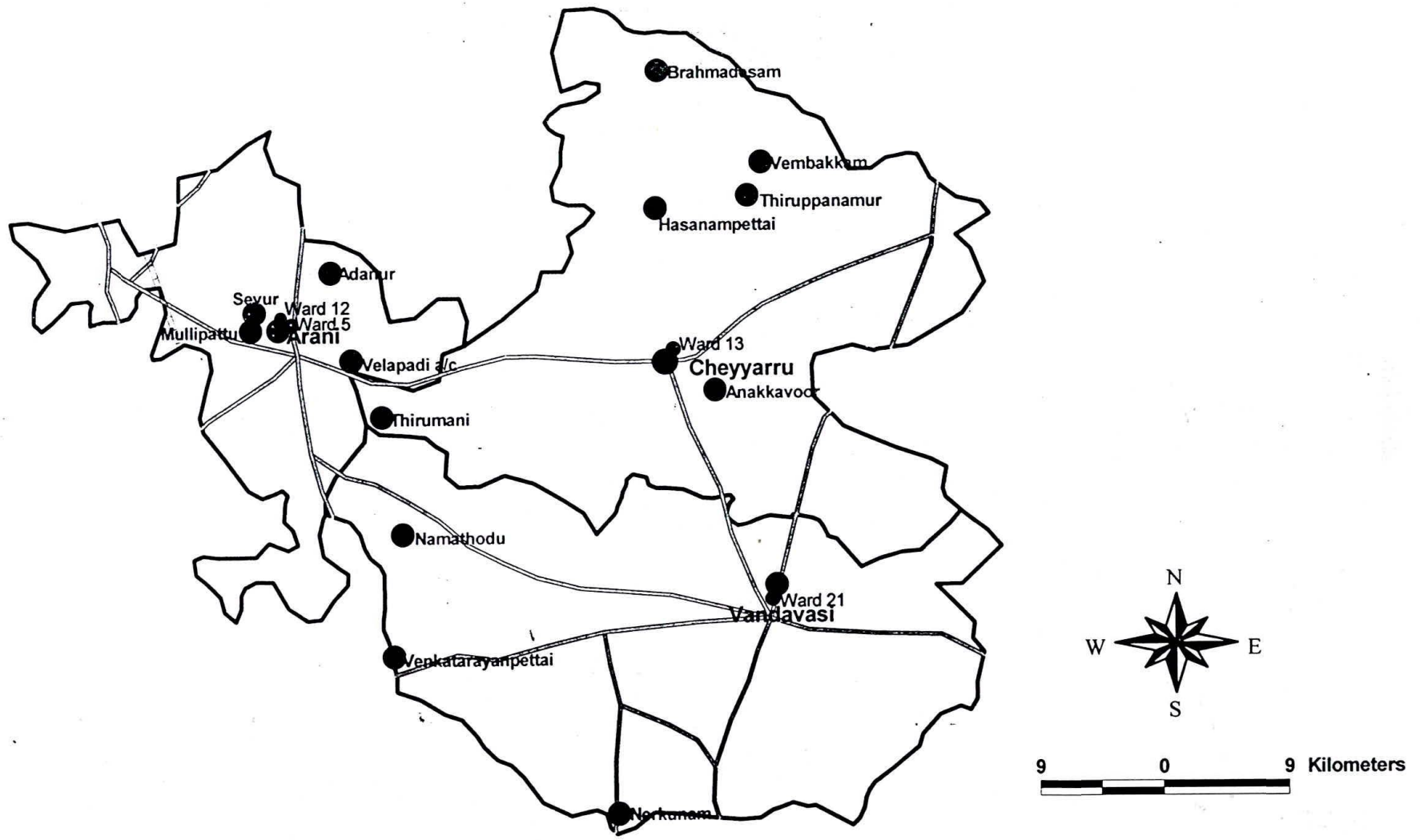
Cheyyar Health Unit
Mass Annual Single Dose - DEC



ICMR\VCRC\EH\ALBEN

LIST OF VILLAGES / WARDS SELECTED FOR EVALUATION IN TANJORE DISTRICT

S.NO	PHC	HSC	VILLAGE/WARD	POPULATION	SELECTION	CLUSTER
1	NADUCAUVERY	NADUCAUVERY	NADUCAUVERY	5374	Spotcheck	Low
2	THIRUVALAMPOLIL	AKKINATHAPURAM	AKKINATHAPURAM	660	Sentinel	Medium
3	KABISTHALAM	KABISTHALAM	KABISTHALAM	5520	Sentinel	High
4	VEERAMANGUDI	ELANGARKUDI	UMBALAPPADI	1587	Spotcheck	Medium
5	AYYAMPETTAI	CHAKKARAPALLI	CHAKKARAPALLI	6254	Spotcheck	Medium
6	PATTESWARAM	UDAIYALUR	UDAIYALUR	2358	Sentinel	Low
7	S.P.KOVIL	S.P.KOVIL	S.P.KOVIL	5809	Sentinel	High
8	THUGILI	THUGILI	THUGILI	2326	Sentinel	Low
9	VEPPATHUR	VEPPATHUR	VEPPATHUR	3080	Spotcheck	Low
10	AMMAPETTAI	AMAPETTAI-III	PUTHUR	3484	Spotcheck	High
11	BUDALUR	KOODANANAL	THIRUKKATTUPALLI	5157	Sentinel	Medium
12	VALLAM	PILLAIYARPATTI	PILLAYARPATTI	2213	Spotcheck	High
13	MUNICIPALITY	KUMBAKONAM	25	3014	Spotcheck	
14	MUNICIPALITY	KUMBAKONAM	34	3295	Sentinel	
15	MUNICIPALITY	TANJORE	7	4164	Sentinel	
16	MUNICIPALITY	TANJORE	41	6189	Spotcheck	

LIST OF VILLAGES / WARDS SELECTED FOR EVALUATION IN CHEYYAR DISTRICT

Sl.No	PHC	HSC	Village/ward	POPULATION	SELECTION	CLUSTER
1	KOVILUR	ANAKAVOOR	ANAKAVOOR	3952		
2	VEMBAKKAM	THIRUPANAMOOR	THIRUPANAMOOR	1690		
3	THELLAR	PENNATHAGARAM	NERKUNAM	1725		
4	MELSEESAMANGALAM	THIRUMANI	THIRUMANI	3162		
5	VEMBAKKAM	THIRUPANAMOOR	VENKATARAYANPETTAI	547		
6	KOLAPPALUR	NAMATHODU	NAMATHODU	1968		
7	NASAL	VELAPADI	VELAPADI	1078		
8	MULLANDRAM	SEVOOR	SEVOOR	4464		
9			BRAMADESAM			
10	PERUNGATTUR	VADAMANAPAKKAM	HASANAMPET	2104		
11	SV NAGARAM	VELLARI	ATHANUR	1336		
12	MALAYAMPATTI	MULLIPATTU	MULLIPATTU	2616		
13	CHEYYAR		WARD 13	565		
14	VANDAVASI		WARD 21	1772		
15	ARANI		WARD 12	2036		
16	ARANI		WARD 5	1830		

LIST OF VILLAGES / WARDS SELECTED FOR EVALUATION IN THIRUVANNAMALAI DISTRICT

SLNO	PHC	HSC	VILLAGE	POPULATION	SELECTION	CLUSTER
1	THIRUSSURPETTAI	MAMBATTU	JADATHARIKUPPAM	411	Spot check	MEDIUM
2	ANANADAL	THANDARAI	THANDARAI	1915	Spot check	HIGH
3	MALAMANJANUR	THANIPADDI- II	THANIPADDI	4862	Sentinel	HIGH
4	KILPENNATHUR	KARUNKALIKUPPAM	KARUNKALIKUPPAM	3772	Sentinel	LOW
5	CHETPET	MARUTHUVAMBADI	ULAGAMPET	1001	Spot check	HIGH
6	KALASAPAKKAM	KILVENNIYANUR	POONDI	1144	Spot check	MEDIUM
7	KOMMANANDAL	KARIKATHUR	THIRUMALAI	1964	Spot check	LOW
8	MELVILVARAYANALLUR	MELARANI	VILVARANI	1500	Sentinel	MEDIUM
9	PUDUPALAYAM	PUDUPALAYAM	G.N.PALAYAM	2723	Sentinel	HIGH
10	SU.VALAVETTI	VERAIYUR	SU.VALAVETTI	1775	Spot check	LOW
11	PALAYANUR	THATCHAMBADI	DEVANUR	1235	Sentinel	MEDIUM
12	VETTAVALAM	ANUKKUMALAI	NEIVANATHAM	854	Sentinel	LOW
13			WARD 7	280	Sentinel	
14			WARD 1	450	Sentinel	
15			WARD 24	158	Spotcheck	
16			WARD 14	333	Spotcheck	

Table 2: Activities and time schedule

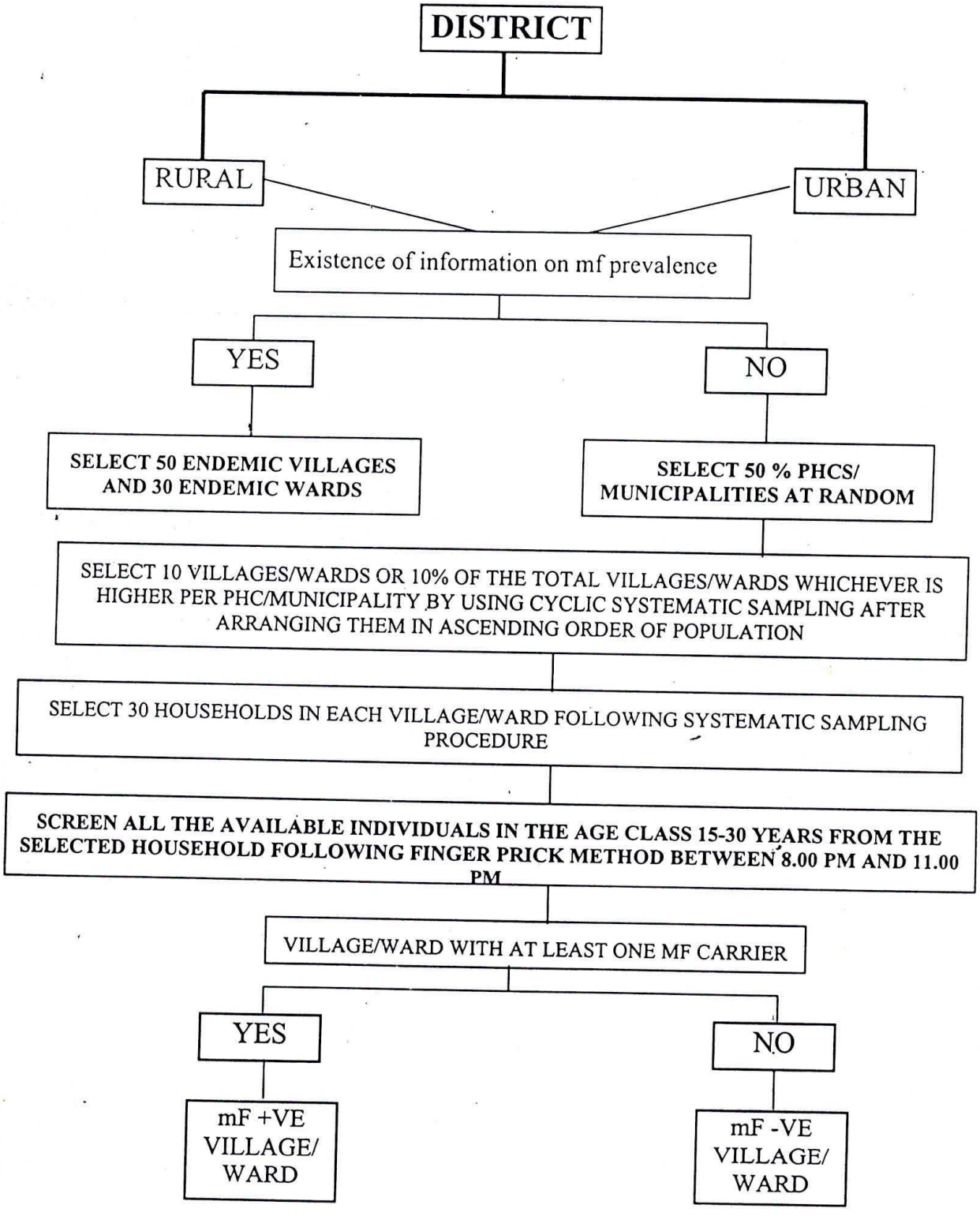
Sl. No.	Activity	Time schedule		Responsible agency
		From	To	
1.	Sensitization and advocacy • State level • District level • PHC level	November 2000 December 2000 December 2000	December 2000	Programme Manager in collaboration with Research Institution
2.	Micro-plan (implementation) preparation at district level	15 12.2000	20.12.2000	Programme manager at district level in collaboration with Research Institution
3.	Training/orientation (health staff) • NBS • Stool examination • Entomological	4.12.2000 11.12.2000 4.12.2000	15.12.2000 20.12.2000 15.12.2000	Research institution
4.	Training/orientation (Other sectors) • IEC • Drug distribution	FIRST WEEK OF FEBRUARY 2000	SECOND WEEK OF FEBRUARY 2000	Programme manager at district level in collaboration with Research Institution
5.	Identification of villages/wards positive for microfilaraemia	20.12.2000	15.1.2001	Programme manager at district level in collaboration with Research Institution
6.	Selection of sentinel villages/wards	15.1.2001	20.1.2001	VCRC
7.	Collection of baseline data on mf prevalence and intensity, and antigeneamia prevalence in sentinel and spot-check villages/wards	20.1.2001	15.2.2001	Research Institution in collaboration with Programme manager
8.	Collection of baseline data on entomological parameters in sentinel villages/wards	15.1.2001	20.2.2001	Programme manager/ Research Institution
9.	Collection of baseline data on geo-helminth prevalence in sentinel and spot-check villages	20.1.2001	10.2.2001	Research Institution

10.	Family Enumeration/ updating and morbidity survey	1.1.2001	10.1.2001	Programme manager
11.	Drug request from PHC/district	10.1.2001	15.1.2001	Programme manager at PHC/ district level
12.	Drug procurement and supply	15.1.2001	15.2.2001	Programme manager at state / district level
13.	Community preparation (IEC campaign including planning)	1.2.2001	15.2.2001	Programme manager at state/district/PHC level in collaboration with Research Institution
14.	Drug distribution	19.3.2001	23.3.2001	Programme manager
15.	Active surveillance for adverse reaction	23.3.2001	28.3.2001	Programme manager
16.	Serious Adverse Experience report	19.3.12001	28.3.2001	Programme manager
17.	Compliance survey	1.3.2001	10.3.2001	Research Institution
18.	Consolidation and reporting of drug distribution and coverage	26.3.2001	1.4.2001	Programme manager

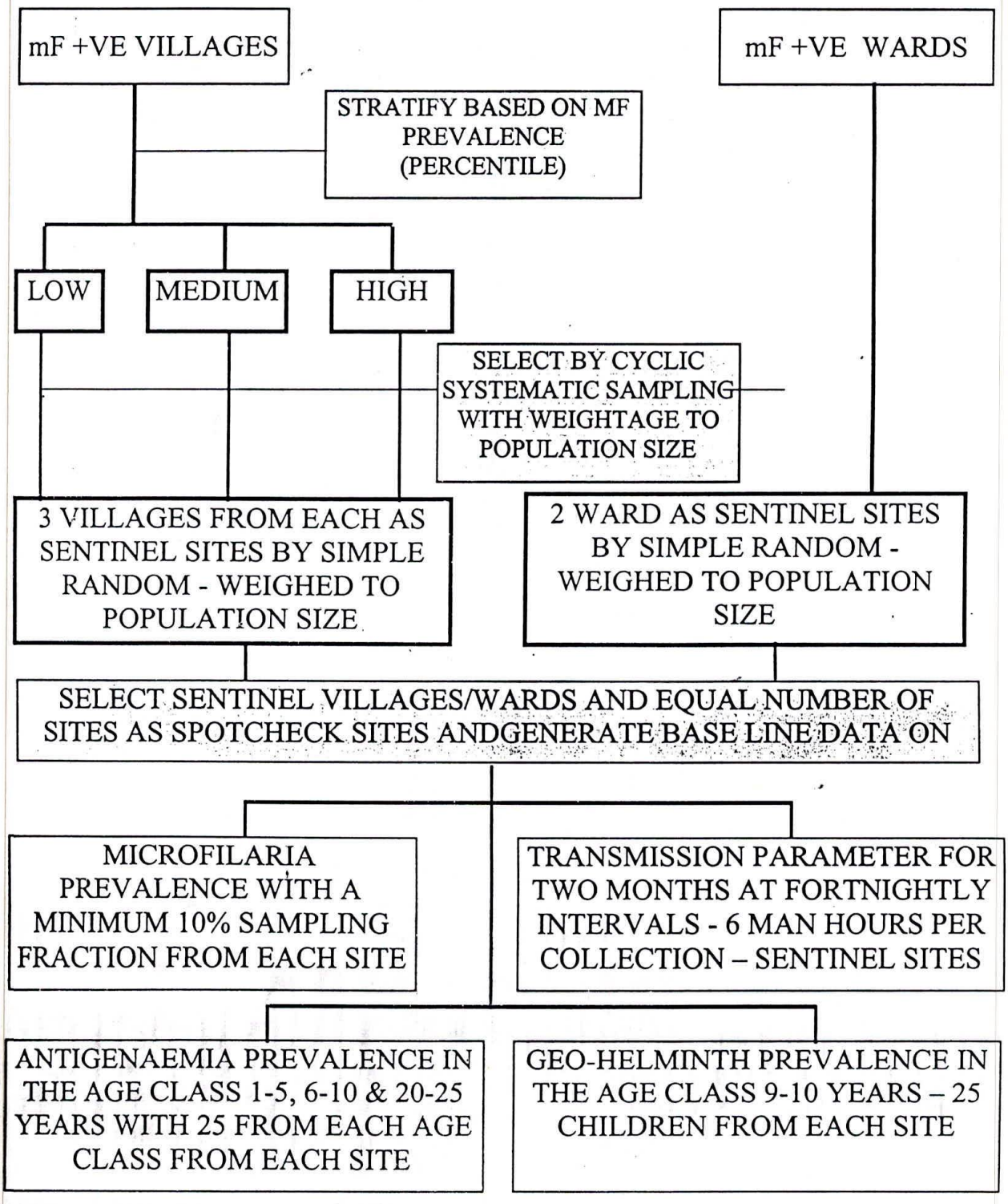
Activity	Reporting Format No.	Report on	To be reported by
Documenting the process	1	Summary sheet on activities at district level	District Level Programme Managers
Documenting the process	2	Summary sheet on activities at PHC level	Medical / Health Officer of the PHC / Municipality
Drug inventory	3	Drug receipt and supply at district level	District Level Programme Managers
Family enumeration and drug distribution	4	Demographic profile and coverage at village level	Medical / Health Officer of the PHC / Municipality
Sample survey for coverage and compliance	5	Compliance survey - questionnaire	Research organization
	6	Summary on estimated coverage and compliance at district level	Research organization
Active surveillance for adverse reaction	7	Drug consumer monitoring form	Medical / Health Officer of the PHC / Municipality
	8	Active surveillance on adverse reaction and perceived benefit	Medical / Health Officer of the PHC / Municipality
Passive surveillance for serious adverse reaction	9	Serious adverse experience report	Medical / Health Officer of the PHC / Municipality
Entomological survey for vector infection and infectivity	10	Entomological dissection results	District Level Programme Managers
	11	Entomological dissection summary	District Level Programme Managers
Sample survey for prevalence of mf carriers	12	Sample blood survey – field form	Medical / Health Officer of the PHC / Municipality & Research organization
	13	Sample blood survey summary at PHC level	Medical / Health Officer of the PHC / Municipality
	14	Sample blood survey summary at district level	District Level Programme Managers & Research organization

Sample survey for prevalence of geo-helminths	15	Sample geo-helminth survey – field form	Research organization
	16	Sample geo-helminth survey summary at district level	Research organization
Survey for disease prevalence while family enumeration	17	Summary on morbidity at district level	District Level Programme Managers
Sample survey for the prevalence of antigenaemia	18	Sample Antigenaemia survey – field form	Research organization
	19	Sample antigenaemia survey summary at district level	Research organization

IDENTIFICATION OF FILARIA ENDEMIC VILLAGES/WARDS



SELECTION OF SENTINEL SITES AND COLLECTION OF BASE LINE DATA ON MICROFILARAEMIA AND TRANSMISSION



IDENTIFICATION OF FILARIA POSITIVE VILLAGES IN A DISTRICT FOR SELECTING SENTINEL VILLAGES FOR IMPACT ASSESSMENT

Purpose: To identify 50 villages and 10 wards that are positive for mf prevalence for forming the universe from which sentinel villages could be selected to assess the impact using microfilaria prevalence and intensity as the indicators

Steps:

I. Selection of endemic PHCs
II. Screening of villages/wards for positive villages/wards
III. Categorization of positive villages based on local (district) prevalence
IV. Selection of sentinel villages and spot-check villages

Steps II and I will be carried out by the programme personnel at state/district level in close co-ordination with the respective research institutes. Step III will be carried out by the VCRC, Pondicherry. The respective research institutes should carry out step IV.

I. Selection of endemic PHCs: (use one the following options depending upon the local situation)

a. If village (rural)/ward (urban) wise information on microfilaria prevalence is available in a district, list out all the positive villages/wards. A minimum of 50 villages and 10 wards should be identified. If the required number of villages and wards are identified from the existing records, furnish the details in the following format and send it to **"The Director, Vector Control Research Centre, Indiranagar, Pondicherry – 605 006",** with a copy to District level Health administrator. The VCRC will determine the sentinel villages based on this data.

Name of the PHC: _____ Name of the district: _____

Sl.No.	Name of the village	No. persons examined	No. persons found positive	Mf rate (%)	Population of the village
1					
2					

(OR)

b. If the number of positive villages/wards based on earlier records is less than 50 and 10 respectively, conduct microfilaria surveys in more villages from PHCs/Municipalities that have recorded mf positivity in the past so as to reach the target of 50 positive villages and 10 positive wards.

(OR)

c. Randomly select 50% of the total PHCs/municipalities in a given district. From each PHC/municipality, select 10 villages/wards or 10% of the total villages/wards which ever is more by following cyclic systematic sampling. Conduct night blood survey for microfilaria survey by screening 60 individuals (include both sexes) in the age class 15-30 years.

Selection of villages/wards for screening: (if you have selected options Ib or Ic, please proceed as under till the end of this document. This does not apply if you have selected the option Ia)

- Prepare list of villages/wards with population for each PHC/municipality
- Arrange the villages in ascending order of population size
- Work out the **class interval** by dividing the total number of villages by ten

E.g. If there are 33 villages in a PHC, the class interval is equal to 33/10=3.3. This figure should be rounded to the nearest whole number – in this case 3.

- From the list of villages the first village will be selected by using the random number between 01 and 'the total number of villages (say the random number 11 and the first village will be 11th village
- The second village will be this random number i.e. 11 plus the class interval i.e. 3 here. So the second village will be 14th village in the list. Similarly the third village will be 14+3=17th village and so on.
- In case of reaching the last village in the list before 10 villages are identified, the

Sl.No	Village Name	Population	Selected villages
1	xxx	223	
2	xxx	324	9
3	xxx	400	
4	xxx	454	
5	xxx	509	10
6	xxx	565	
7	xxx	622	
8	xxx	680	
9	xxx	739	
10	xxx	799	
11	xxx	860	1
12	xxx	922	
13	xxx	985	
14	xxx	1049	2
15	xxx	1114	
16	xxx	1180	
17	xxx	1247	3
18	xxx	1315	
19	xxx	1384	
20	xxx	1454	4
21	xxx	1525	
22	xxx	1597	
23	xxx	1670	5
24	xxx	1744	
25	xxx	1819	
26	xxx	1895	6
27	xxx	1972	
28	xxx	2050	
29	xxx	2129	7
30	xxx	2209	
31	xxx	2290	
32	xxx	2372	8
33	xxx	2455	

selection of next village will continue from the beginning of the list again. For e.g. in this case, the selected villages are 11, 14, 17, 20, 23, 26, 29, 32, 2 and 5. In this example villages of serial number 2 and 5 are selected by adding the class interval 3 with 32. Here the cycle continued to the beginning of the list to complete the required 10 villages.

1. From each of the selected village/ward, identify 30 households in the selected villages, spreading over to the entire village.

   This can be achieved by systematic sampling procedure with household as the sampling unit. Identify the first household by a random start. The subsequent households can be identified by adding the class interval to the first household. Class interval can be determined by dividing the total number of households by 30.

   In case, the selected household is locked or people are not available, sample the people in the adjacent household.

   Collect blood smear from all the available individuals in the age class (include both sexes) 15-30 years from the selected households using finger prick methods and collecting 20 µl blood (3-4 drops approximately) between 8.00 PM and 11.00 PM.

2. A village is declared positive even if one mf carrier is detected.

3. Furnish the details in the following format and send it to **"The Director, Vector Control Research Centre, Indiranagar, Pondicherry – 605 006",** with a copy to District level Health administrator. The VCRC will determine the sentinel villages based on this data.

Name of the PHC: _____ Name of the district: _____

Sl. No.	Name of the village	No. persons examined	No. persons found positive	Mf rate (%)	Population of the village
1					
2					

FORM:ENT

FORMAT: 11

ENTOMOLOGICAL DISSECTION - SUMMARY *

NAME OF THE DISTRICT: _____ DATE: _____

REPORTED BY * : _____

VILLAGE	NAME	NUMBER OF MOSQUITOES				No. parasites detected	
		collected	Dissected	Infected	Infective	Any stage	L3
1							
2							
3							
4							
5							
6							
7							
8							
9							
10							
	TOTAL						
WARD							
1							
2							
	TOTAL						
GRAND TOTAL							

* : TO BE FILLED IN BY THE DISTRICT LEVEL OFFICERS

FORM:SBS

FORMAT 12

SAMPLE BLOOD SURVEY - FIELD FORM

DISTRICT: _____

VILLAGE/WARD _____ PHC/MUNICIPALITY: _____

Street Name : _____ Date: _____

Collected by: _____ Examined by: _____

Id No.	Door No.	Name	Relationship	Age	Sex	Slide No.	Mfc*

*:: Enter the actual count after examination

Samples should be drawn after 8.00 PM anf for each street start at a new page

FORM:SBS SUMMARY

FORMAT: 13

SAMPLE BLOOD SURVEY SUMMARY AT PHC LEVEL*

NAME OF THE PHC: _____

REPORTED BY * : _____ DATE: _____

Sl.No.	VILLAGE	POPULATION	No. SMEARS COLLECTED	No. +VE FOR MF	TOTAL MF
1					
2					
3					
4					
5					
6					
7					
8					
9					
10					
11					
12					
13					
14					
15					
16					
17					
18					
19					
20					

* : TO BE FILLED IN BY THE MEDICAL / HEALTH OFFICERS OF PHC/MUNICIPALITY

FORM:SBS SUMMARY

FORMAT: 14

SAMPLE BLOOD SURVEY SUMMARY AT DISTRICT LEVEL*

NAME OF THE DISTRICT: _____ DATE: _____

REPORTED BY * : _____

Sl.No.	VILLAGE	PHC	POPULA-TION	No. SMEARS COLLECTED	No. +VE FOR MF	TOTAL MF
1						
2						
3						
4						
5						
6						
7						
8						
9						
10						
11						
12						
13						
14						
15						
16						
17						
18						
19						
20						

* : TO BE FILLED IN BY THE DISTRICT LEVEL OFFICERS

SAMPLE GEO-HELMINTH SURVEY - FIELD FORM*

NAME OF THE DISTRICT: _____ DATE: _____

NAME OF THE VILLAGE/WARD _____ NAME OF THE PHC: _____

REPORTED BY * : _____

Sl.No.	NAME	FATHER'S NAME	DOOR No.	AGE	SEX	EGG COUNT					
						ROUND WORM		HOOK WORM		WHIP WORM	
						eps**	epg#	eps**	epg#	eps**	epg#
1											
2											
3											
4											
5											
6											
7											
8											
9											
10											
11											
12											
13											
14											
15											

* TO BE FILLED BY RESEARCH ORGANISATION

eps**: egg per smear epg#: egg per gram

FORM:SBS SUMMARY

FORMAT: 16

SAMPLE GEO-HELMINTH SURVEY SUMMARY AT DISTRICT LEVEL

NAME OF THE DISTRICT: _____

REPORTED BY * : _____ DATE: _____

Sl.No.	VILLAGE	PHC	NO. SAMPLES		No. SPECIES	DENSITY
			COLLECTED	POSITIVE		
1						
2						
3						
4						
5						
6						
7						
8						
9						
10						
11						
12						
13						
14						
15						
16						
17						
18						
19						
20						
21						
22						
23						
24						
25						
26						
27						
28						

* : TO BE FILLED IN BY RESEARCH ORGANISATION

FORM:DISEASE

FORMAT: 17

SUMMARY ON MORBIDTY AT DISTRICT LEVEL

NAME OF THE DISTRICT: _____ REPORTED BY *: _____

DATE: _____

Sl.No.	VILLAGE	PHC	POPULATION			HYDRO CELE	LYMPHOEDEMA		
			MALE	FEMALE	TOTAL		MALE	FEMALE	TOT
1									
2									
3									
4									
5									
6									
7									
8									
9									
10									
11									
12									
13									
14									
15									
16									
17									
18									
19									
20									
21									
22									
23									
24									
25									
26									
27									
28									
29									
30									

*: TO BE FILLED IN BY THE DISTRICT LEVEL OFFICERS

FORM:ICT

FORMAT 18

SAMPLE ANTIGENEAMIA SURVEY - FIELD FORM*

DISTRICT: _____ VILLAGE/WARD _____

PHC/MUNICIPALITY:_____ Street Name : _____

Collected and examined by: _____ Date: _____

Id No.	Door No.	Name	Father's Name	Age	Sex	ICT No.	Result +ve/-ve

* TO BE FILLED BY RESEARCH ORGANISATION

FORM:SBS SUMMARY FORMAT: 19

SAMPLE ANTIGENAEMIA SURVEY SUMMARY AT DISTRICT LEVEL*

NAME OF THE DISTRICT: _____ DATE: _____

REPORTED BY * : _____

Sl.No.	VILLAGE	PHC	POPULA-TION	No. SCREENED	No. +VE FOR Ag
1					
2					
3					
4					
5					
6					
7					
8					
9					
10					
11					
12					
13					
14					
15					
16					
17					
18					
19					
20					

* TO BE FILLED BY RESEARCH ORGANISATION

INFORMATION LEAFLET ON ALBENDAZOLE IN THE ELIMINATION OF FILARIASIS FOR PROVIDERS

(If you are helping someone else to take albendazole, read this leaflet before administering treatment)

What is albendazole?

Albendazole is a broad-spectrum anti-helminthic drug effective against roundworms, hookworms, whipworms, pinworms, strongyloidosis, tapeworms, neurocysticercosis, larva migrans (visceral and cutaneous) and hydatid disease. It is also effective against a common intestinal infection, giardiasis. Co-administration of albendazole with DEC has marginally better effectiveness on lymphatic filariasis.

How is it available?

It is available as chewable tablets (200mg & 400mg). For children, it is also available as a suspension (2% & 4%)

What is the dose of albendazole?

The dose depends on the infection to be treated. The table below gives the dosage schedule for different infections

Infections	DOSE
Intestinal worms	A single dose of 400 mg
Strongyloidosis	400 mg per day X 3 days
Giardiasis	400 mg per day X 5 days
Hydatid disease	15 mg / kg / day X 4 weeks
Tapeworm	400 mg / day X 3 days
Neurocysticercosis	15 mg / kg / day X 2 – 4 weeks

What are the advantages of giving albendazole?

- It has a single dosage schedule.
- Mild discomfort if you are having worms.
- Effective against large number of intestinal worms.(wide spectrum)

What should be considered before taking albendazole?

1. You must not take albendazole if you are allergic to albendazole or any similar type of medicine used to clear parasites
2. If you have ever had an allergic reaction (such as a rash) when taking another worming preparation, you should tell persons responsible for drug administration before you take albendazole
3. Albendazole should not be taken during pregnancy (Before taking albendazole, you should tell the person responsible for drug administration if you think you may be pregnant).
4. Albendazole is not recommended for lactating mothers and children under 2 years of age (There is no evidence to suggest that single dose albendazole therapy presents a risk to the development of breast-fed babies, but please exercise caution and if you or the baby experience unusual effects tell the person responsible for administering treatment or your doctor at once)
5. Albendazole should not be given to people who have fever, liver and kidney disorders.(You must tell the person responsible for drug administration if you are taking any other treatment)

How and when should albendazole be given?

Albendazole tablets can be chewed or swallowed. It can be taken anytime during the day and preferably after food to minimize the side reactions. No special fasting or purgative is required with albendazole treatment

What are the side reactions to albendazole?

Side reactions following administration of a single dose as for worm infections are minimal. Some of the side reactions that may be observed are epigastric pain, nausea, vomiting, headache and dizziness. If the symptoms become severe or if the person develops rashes or itching, the health worker should be informed and the doctor consulted at once.

Are there serious side reactions to giving a higher dose of albendazole or its prolonged use?

Yes. High dose of albendazole or its prolonged use can cause abnormalities in the liver function, bone marrow depression and alopecia. However, these reactions do not occur with a single dose as is given for intestinal worms.

Has albendazole any action on filarial parasite ?

- Albendazole, when given in high dosages (400 mg / per day for 3 weeks) has been shown to kill the adult filarial parasites.
- In a single dose, it is likely to damage the adult parasite, but inadequate to clear parasitaemia by itself.

- Therefore, single dose albendazole alone is not indicated for treatment of parasite carriers.
- Co-administration of DEC and albendazole is comparable to DEC alone in terms of tolerability.
- The co-administration of the two drugs has similar or marginally better effectiveness compared to DEC.

Why to give albendazole together with DEC for controlling filariasis?

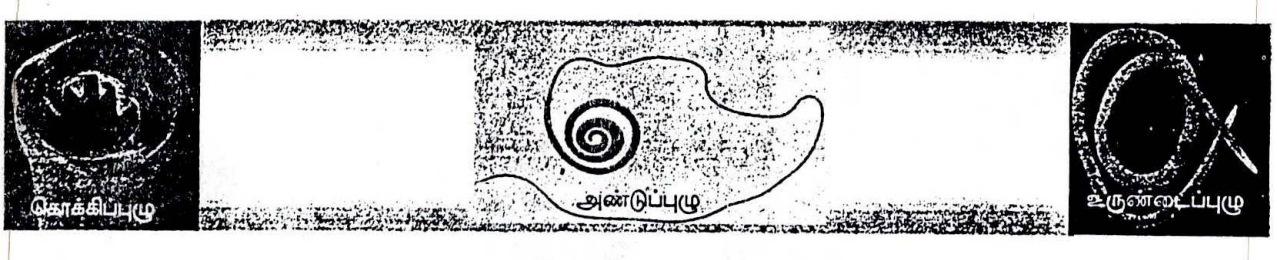
There are several reasons for using albendazole in filariasis control programs such as:-

- When albendazole is co-administered with DEC, the deworming effect of albendazole is likely to be perceived and appreciated by the community and hence might increase the compliance. DEC will thus be taking a piggy ride on albendazole
- The community and particularly children will benefit indirectly by the deworming effect of albendazole resulting in an improvement in growth and nutritional status
- It will be cost-effective to have a single program to control two infections of public health importance namely filariasis and geohelminths
- Albendazole also has some anti-filarial action and hence the co-administration of DEC and albendazole will have a sustainable effect against filariasis than DEC alone

Donor of albendazole

For the filariasis elimination program, albendazole is donated by GSK for under the auspices of WHO Lymphatic Filariasis elimination .

Issued by Vector Control Research Centre, Pondicherry, Tuberculosis Research Centre, Chennai and Department of Public Health, Tamil Nadu



பொதுவான குடற்புழுக்களும் அவற்றை தடுக்கும் முறைகளும்

நம்மில் 60 சதவிகிதக்கும் மேலானோருக்கு குடற்புழுக்களால் பாதிப்பு ஏற்பட்டுள்ளது. இந்நோய் சிறுவர் சிறுமியர்களிடமே அதிகமாக காணப்படுகிறது.

பெரும்பாலும் அதிகம் உடல்நலக்கேடு விளைவிப்பன கொக்கிப்புழு, அண்டுப்புழு, உருண்டைப்புழு எனப்படும் குடற்புழுக்கள். இந்தவகை குடற்புழுக்கள் மனிதனின் குடலில் வசிக்கின்றன.

இந்தவகை குடற்புழுக்களின் முட்டைகள் மனிதனின் மலத்தின் மூலம் வெளிவந்து நீர் மற்றும் மண்ணில் கலந்து விடுகின்றது.

இந்த முட்டைகள் அசுத்தமான நீர், ஈக்கள் மொய்க்கும் உணவு வகைகளை உட்கொள்ளுதல் மூலமாகவும், வெறும் கால்களுடன் அசுத்தமான இடங்களில் நடத்தல் காரணங்களாலும் மனிதனின் உடலுக்குள் செல்கின்றன. குடலை அடைந்தபின் இவைகள் புழுக்களாக மாறுகின்றன.

பொதுவாக வீட்டின் வெளிப்புறங்களில் மலம் கழிக்கும் பழக்கத்தின் காரணமாக இந்நோய் ஒருவரிடமிருந்து மற்றவர்களுக்கு பரவுகின்றது.

குடற்புழுக்களினால் ஏற்படும் பாதிப்புக்கள்

நாம் உட்கொள்ளும் உணவின் சக்தி நமக்கு கிடைக்கவிடாமல் இந்த புழுக்கள் செய்துவிடுகின்றன. மேலும் இதன்விளைவாக இரத்தசோகை நோய் ஏற்பட்டு பாதிக்கபட்டவர்கள் வளர்ச்சி குறைந்து காணப்படுகிறார்கள். இதனால் ஏற்படும் சோர்வின் காரணமாக சிறுவர்கள் படிப்பில் கவனக்குறைவு உண்டாகி அவர்கள் எதிர்காலம் பாதிக்கப்படுகின்றது.

குடற்புழு நோயை தடுக்கும் முறைகள்

- உணவு பொருட்கள் மற்றும் குடிநீர் உள்ள பாத்திரங்களை சரியாக மூடிவைக்கவும்.
- திறந்த பாத்திரங்களில் வைக்கப்பட்ட, ஈக்கள் மொய்த்த உணவுபண்டங்களை உண்பதை தவிர்க்கவும்.
- உணவு உண்ணும் முன் கைகளை சுத்தமாக கழுவவும்.
- கண்ட இடங்களில் மலம் கழிப்பதை தவிர்க்கவும்.
- மலம் கழித்தபின் கைகளை சுத்தமாக கழுவவும்.
- வெளியில் செல்லும் பொழுது காலணிகளை உபயோகிக்கவும்.

நல்ல பயனளிக்கும் மாத்திரைகள் மூலம் குடற்புழு நோயை குணப்படுத்தலாம். 6 மாதங்களுக்கு ஒருமுறை உட்கொள்வது மிகுந்த பயனளிக்கும். இந்த மாத்திரைகளை தமிழக பொது சுகாதாரத்துறை எல்லோருக்கும் இலவசமாக வருடம் ஒருமுறை ஒருசில குறிப்பிட்ட மாவட்டங்களில் வழங்குகின்றது.

இந்த மாத்திரைகளை உட்கொண்டு குடற்புழு நோயை கட்டுபடுத்த ஒத்துழைக்க வேண்டுகிறோம்.

வெளியீடு:
தமிழக பொது சுகாதாரத்துறை மற்றும்
கொசுத்தடுப்புஆராய்ச்சி நிலையம், புதுவை

யானைக்கால் நோயை ஒழிக்க ஆண்டுக்கு ஒருமுறை டி.இ.சி. மாத்திரை சாப்பிடவும்.

டி.இ.சி. மாத்திரை உங்கள் இல்லந்தோறும் இலவசமாக வருடம் ஒருமுறை வழங்கப்படும்.

யானைக்கால் நோயை ஒழிக்க [illegible]

கை, கால் வீக்கம் விரை வீக்கம் ஆகியவை யானைக்கால் நோயின் மாறாத அறிகுறிகள்.

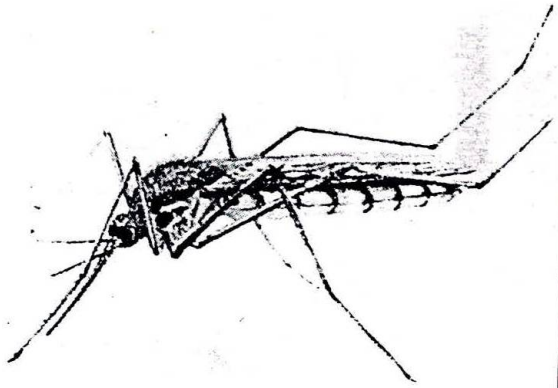
இந்நோய் [illegible] கிருமிகளால் உண்டாகின்றது.

தொடக்க நிலையில் உடலின் உட்பகுதியான நிணநீர் குழாயை தாக்குகிறது. இந்நோய் [illegible] தெரிவதில்லை.

இக்கிருமிகள் கொசுக்களால் நம்மிடையே பரவுகின்றது.

கொசுக்களைக் கட்டுப்படுத்துவதின் மூலம் இந்நோய் பரவுவதை தடுக்கமுடியும்.

- [illegible] பாத்துக்கொள்ளவும்.
- [illegible] தெளிக்கவும்



நோய்க்கிருமிகளை ஒழிக்க டி.இ.சி. மாத்திரை உட்கொள்ளவும். வருடம் ஒருமுறை அனைவரும் இந்த மாத்திரையை சாப்பிட்டால் இப்பகுதியிலிருந்து இந்த நோயை ஒழித்துவிடலாம். ஆகாரத்திற்குப் பின் இந்த மாத்திரையை சாப்பிடவும்.

வெளியீடு : கொசுத்தடுப்பு ஆராய்ச்சி மையம், புதுவை.
பொது சுகாதாரம் மற்றும் நோய் தடுப்பு மருத்துவத்துறை, தமிழக அரசு.

(4)

DIS-7B.16

FILARIAL LYMPHOEDEMA - REDUCTION BY SURGERY IMMEDIATE AND LATE RESULTS

S. Jamal and S. P. Pani

City Hospital (formerly Medical College), Thanjavur (S.J), and Vector Control Research Centre, ICMR (S.P.P) Pondicherry. INDIA

INTRODUCTION:

For the last three decades for filarial lymphedema of the legs the first author has been doing lymph Nodo Venous Shunt (NVS) (1) and if needed staged excision. In this paper immediate and late results of 82 cases are presents.

MATERIAL AND METHOD:

All patients with filarial lymphedema were managed by as per our protocol (2). Those who desired to have the lymphedema reduced further were subjected to NVS at groin (1) and if needed staged excision in one to five stages at 10 to 12 days interval. Only unilateral filarial lymph edema cases examined by the same author repeatedly were selected for this study, and those who had acute inflammation within the past two months were excluded. There were 82 patients with unilateral lymphedema, equal number of males and females, their ages ranged from 10 to 73 years. NVS alone was done in 29 cases and additional staged excision numbering up to five were done in 53. The follow up period was 2 to 10 years. For evaluating the edema, circumference measurements from fixed points (1,3,4,) was done prior to surgery, at the time of discharge form the hospital, and at each follow up visit. The edema is calculated as the difference in the sum of circumferences of the affected to the normal limb, and the reduction of edema from pre to post operation and in the follow up period. Twenty-nine patients had only NVS and their hospital stay ranged form 7 to 10 days (average 8 days) and the follow up period 2 to 9 years (mean 4.3 years). Fifty nine patients had in addition to NVS, staged Excisional surgery, their hospital stay ranged from 21 to 90 days (average 36 days) and their follow up period 2 to 10 years (mean 5.4 years)

RESULTS:

In those cases were NVS alone was done (N: 29) the reduction of edema volume at the time of hospital discharge (immediate) was 85.4% in an average period of 8 days hospital stay. In those cases were additional Excisional surgery was done (N: 53) the reduction was 84.4% in an average period 36 days of hospital stay *Table 1, Fig 1.* For the late results the follow up period for NVS alone (2 - 9 years) the mean duration was 4.3 years, and the reduction 78.3%, and for those who had additional excision the follow up period (2- 10 years) the mean duration was 5.4 years, and the reduction 76.3%. *Table 2, Fig.2 and 3.* Unlike in conservative management , there was decrease in edema volume in the presence of septic foci in both the groups but to a lesser degree.(2) In the late results for both groups the change in the percentage of edema were not statistically significant with regard to age and gender or with respect to the presence or absence of septic foci.

DISCUSSION:

In the Indian scenario conservative management of filarial edema gives some reduction in grade II but much less reduction in grade III but both these are negated in the presence of recurrence of septic foci (2). On the contrary daily administration of Coumarin showed sustained reduction (5) but has to be given for a long time. For faster and sustained results we resorted to surgery. NVS at groin provides a by pass for the lymph to drain into venous system at the lower most lymph node level. This works well if the limb is elevated while sleeping. The surgery has to be advocated only to those who showed reduction or maintain the same level of edema with medical treatment and request for further reduction. The NVS remains patent for a long time provided there has been no acute secondary inflammatory attack. This evidenced by keeping the lymph elevated overnight and noting the extent of edema reduction *Fig 4.*

Table 1

Surgery for filarial edema initial results

	NVS Alone average 8 days stay			NVS + Excision average 38 days		
Gender	No.	%reduction	SEM	No.	%reduction	SEM
Female	14	88.1	13.6	27	80.5	3.7
Male	15	82.8	8.1	26	88.1	10.6
All cases	29	85.4	4.8	53	84.4	5.2

Table 2

Surgery for filarial edema late results

	NVS Alone mean follow up 4.3 years			NVS + Excision mean 5.3 years		
Gender	No.	% reduction	SEM	No.	% reduction	SEM
Female	14	71.5	6.3	27	70.1	6.3
Male	15	84.6	6.6	26	82.0	9.5
All cases	29	78.3	4.6	53	76.3	5.4
Septic foci						
Absent	25	80.7	4.6	28	80.0	8.8
Present	4	63.0	2.6	25	65.9	8.8

In grade III cases (circumference difference between normal and edematous leg more than 5 cm at one or more sites) (3) additional staged excision is required to remove the baggy skin, fibro- fatty subcutaneous tissue and to correct the folds and bulges in the leg. To preserve the vascularity of the flaps and to get an acceptable size and shape of the leg the excisional surgery has to be staged at 10 -12 day's interval. The immediate result shows greatest edema reduction at the shortest time. As with other methods of treatment for edema, the reduction in edema can be maintained only by continued supportive measures like wearing bandage/stocking, foot care and prevention/treatment of secondary infection. However in the Indian scenario due to socio- economic, climatic, and cultural reasons the

patients more often abandon the supportive methods in the long run, Even then the late results in our study shows that edema reduction is sustained for a long time.

CONCLUSION:

For filarial Lymphedema NVS and Excisional surgery provide high degree of edema reduction at the shortest time. The late results show the reduction is sustained for a long time and is the best for Grade III edema which otherwise will progressively increase.

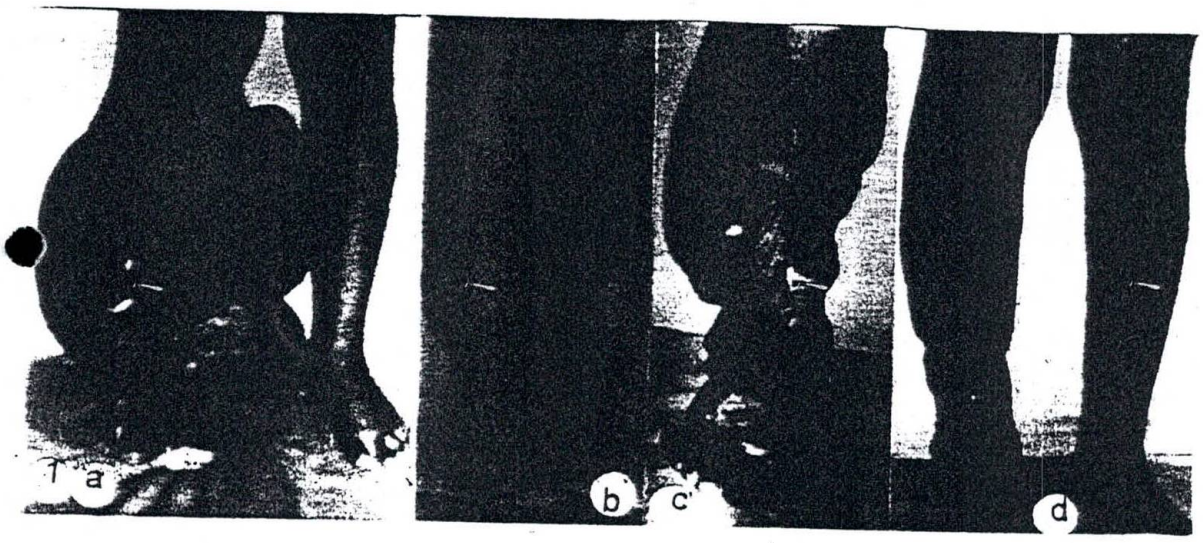


Fig 1. a. Pre-op b. 8 days after NVS. c. After first stage excision. d. After three excisions

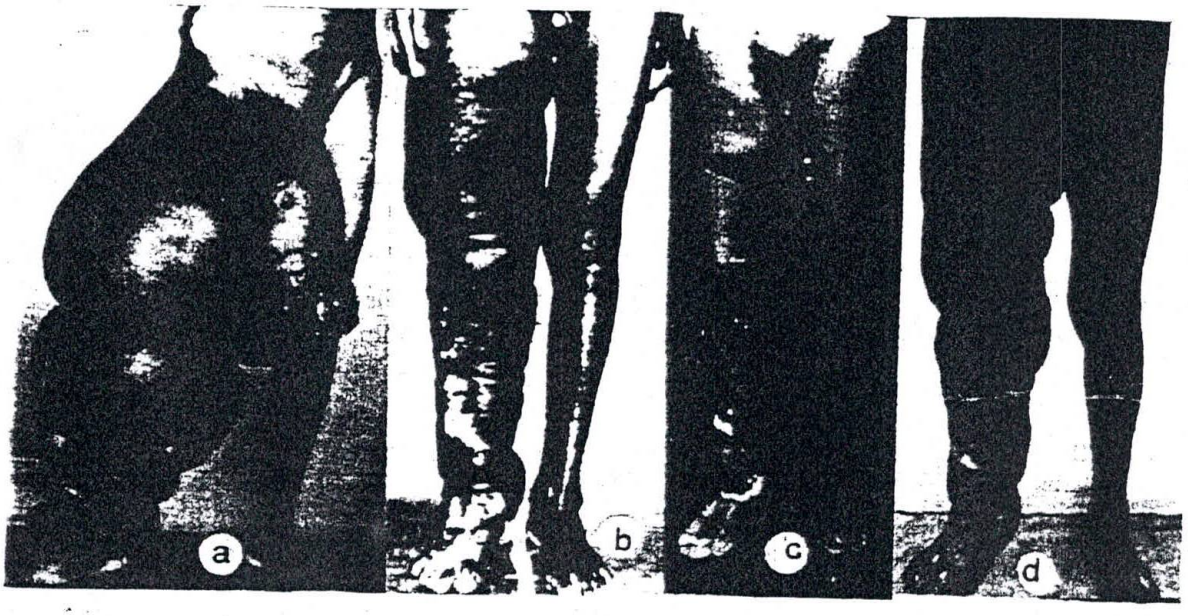


Fig 2: a. Pre op. b. After five staged excision. c. After six years. D. After ten years

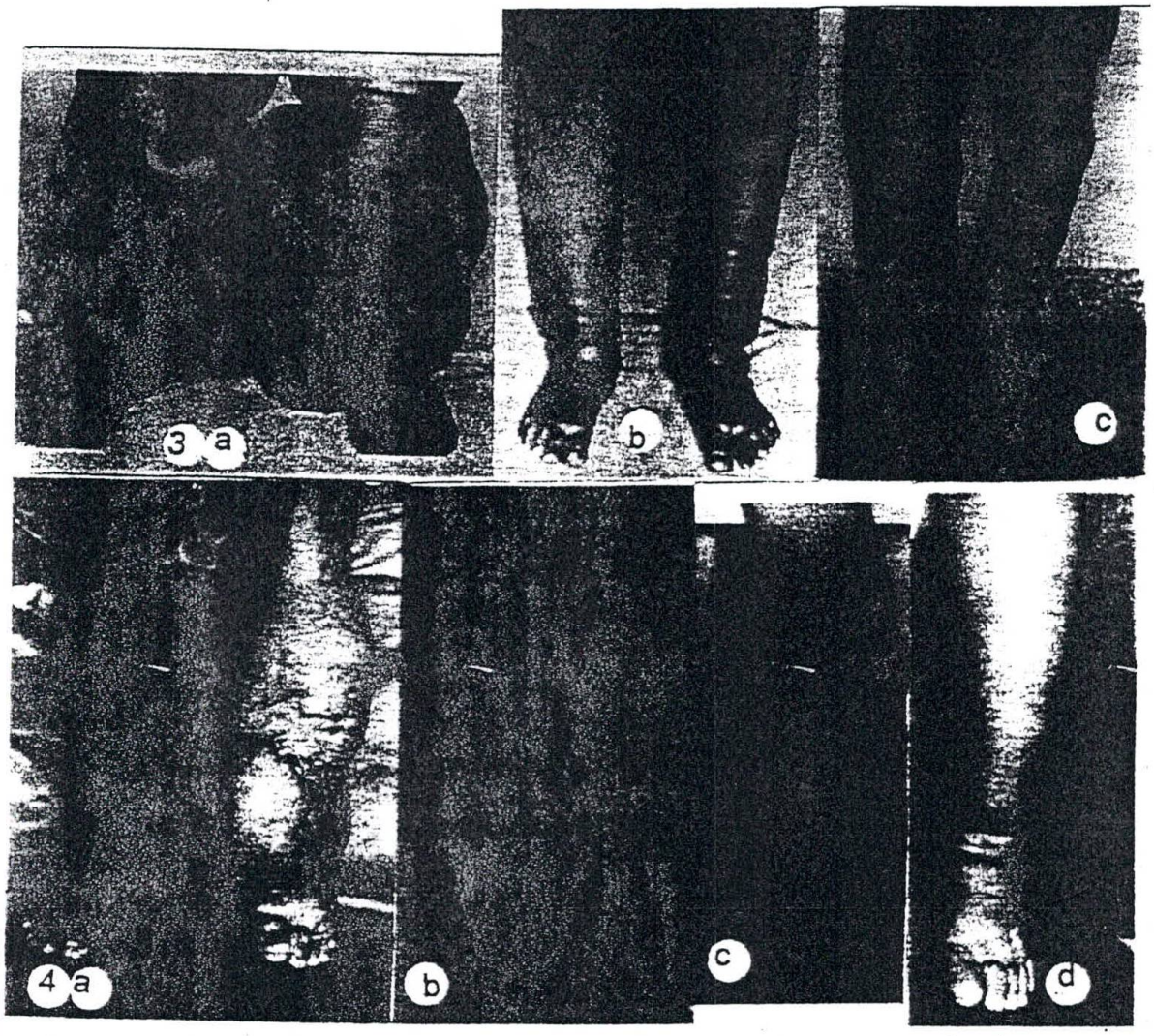


Fig 3: a. Pre - op. b. After four stages for left and three stages for right leg excision. c. After eight years follow up

Fig 4: a. Pre-op. b. After three stage excision. c. After 7 years - recurrence. d. Reduction after overnight elevation showing the NVS is functioning

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Treatment seeking behaviour and costs due to acute and chronic forms of lymphatic filariasis in urban areas in south India

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Summary Previous estimates on the economic burden of lymphatic filariasis (LF) in India and elsewhere were primarily based on studies in rural areas. We investigated the treatment costs due to acute and chronic forms of LF in urban areas, where nearly one-third of the affected people live. Almost 98% of the patients with acute episodes of adenolymphangitis (ADL) underwent treatment and 49% of chronic patients also received treatment. The average treatment cost per ADL episode (n = 108) was Rs 22.21 ± 53.84 (US$ 0.46 ± 1.12). The overall (n = 200) treatment costs incurred by a chronic patient per visit were Rs 16.71 ± 62.36 (US$ 0.35 ± 1.30); for those who paid (n = 98) they were Rs 34.10 ± 85.90 (US$ 0.71 ± 1.79). These costs are considerably higher than in rural areas. Government health centres and private practitioners were important sources of treatment. Treatments received from private practitioners were considerably more expensive than those from government health facilities. The cost of medicine accounted for 44% and 50% of the total expenditure on treatment for acute and chronic disease patients, respectively. The medical personnel from these treatment sources need to be trained on the new morbidity management methods, which are likely to be more effective than the current methods of treatment.

keywords lymphatic filariasis, treatment costs, acute disease, chronic disease, urban areas, India

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Introduction

Lymphatic filariasis (LF) is widely prevalent in developing countries and approximately 120 million people living in 80 countries are infected. Globally, LF is the second leading cause of permanent and long-term disability (WHO 1995). India is a major endemic country for LF. About half of its population is exposed to the risk of infection and an estimated 48.11 million people are infected (WHO 1994). Recent estimates, based on the immunochromatography card test, suggest that the infected population could be 116 million in India (Das *et al.* 2001). Quantification of the social and economic burden of LF has been identified as a priority research area in view of the ongoing LF elimination programme.

Studies in India (Ramaiah *et al.* 2000) and Ghana (Gyapong *et al.* 1996) showed that LF inflicts considerable social and economic burden on the affected communities. The annual economic loss in India alone was estimated at close to 1 billion US$. These estimates have also helped to show that the benefits of control/elimination of LF through annual mass treatments are much higher than the costs (Ramaiah *et al.* 2000). So far, the estimates of labour loss and treatment costs have primarily been based on the data collected from rural areas. However, a considerable proportion of LF patients live in urban areas and information on costs incurred by them on treatment is scarce. Therefore, we undertook this study in the urban region of Pondicherry in south India to assess the LF-related treatment costs of various treatment sources and the factors determining their choice. We also studied treatment seeking behaviour, which will be useful in developing morbidity management strategy towards elimination of LF.

Study area

The study was conducted in three urban areas – Cuddalore, Villupuram and Pondicherry located about 160–180 km south of Chennai in south India. Cuddalore and Villupuram are the district headquarter towns and Pondicherry is the headquarter town of the union territory of Pondicherry. All three study areas – Cuddalore, Villupuram and Pondicherry

are endemic for bancroftian filariasis transmitted by *Culex quinquefasciatus*. The population of these urban areas was 350 000, 418 630 and 516 985, respectively, as per the census data of 1991. The disease rate was 3–6%.

The health care facilities in the study areas include government run general hospitals and clinics and hospitals run by private practitioners. Exclusively for the treatment of LF, all the three urban areas have the National Filaria Control Programme (NFCP) clinics, run by the state government. The services offered by filarial clinics include blood examination for microfilaria (mf) and treatment of mf carriers and chronic patients.

Methods

A list of chronic patients in all localities of Cuddalore and Villupuram is kept by local health authorities and for Pondicherry by the Vector Control Research Centre, Pondicherry. From the lists, 50 patients each from Cuddalore and Villupuram and 100 from Pondicherry (totally 200 patients) were selected using systematic random sampling.

A semi-structured interview schedule was used to collect the information on treatment seeking behaviour and costs of treatment. The interview schedule was initially prepared in English and translated into Tamil. The Tamil version of the questionnaire was pre-tested on a few patients and necessary modifications were made and used in the study. Two teams of two members each administered the questionnaires to the patients. The study was conducted during 1999–2000.

For each respondent, information on sex, age, occupation, educational qualification and income level was collected. The questionnaire included the following questions: (1) Did he/she undergo treatment for the disease condition (acute or chronic disease)? (2) If yes, what were the sources of treatment? (3) What was the type of treatment received? (4) Why did he/she choose a particular source of treatment? and (5) How much expenditure was incurred on treatment in terms of doctor's fee, medicines, investigations, travel, etc?

To assess the costs due to chronic disease, all 200 patients were visited once during the study period and expenditures noted in detail. We also explained the characteristics of acute adenolymphangitis (ADL) (Ramaiah *et al.* 1996) and asked patients if they had suffered any episodes in the past year. If so, the details on treatment for the most recent ADL episode were documented.

Data were analysed using the SPSS program.

Results

Of the 200 chronic patients interviewed, 87 (43.5%) were male; 158 (45 males and 113 females) had lymphoedema of lower limbs, 31 men had hydrocoele and 11, both hydrocoele and lymphoedema of lower limbs. The mean age of the patients with lymphoedema and hydrocoele was 46 ± 17 and 35 ± 19 years, respectively. The mean duration of lymphoedema and hydrocoele among the respondents was 12 and 6 years, respectively. Most respondents (68.5%) lived in thatched houses; 47.5% were casual labourers and lived on daily wages or earnings. The per capita income of more than 90% of the patients was <25 US$ per month.

Treatment seeking for acute episodes of ADL

A total of 110 (55%) chronic patients reported occurrence of ADL episodes during the 1-year period prior to this investigation. These 110 patients suffered a total of 309 ADL episodes. However, the cost details presented here pertained only to the most recent episode.

Of 110 patients affected by ADL episodes, 108 (98.2%) underwent treatment: 44 (40.7%) received treatment from government health facilities, 26 (24.1%) from private practitioners and 38 (35.2%) self-treated with medicine from the local medical shops. The proportion of patients seeking treatment from government sources was 47% in Pondicherry compared with 34% in Cuddalore and 30% in Villupuram. About 6.5% of the patients sought treatment from the NFCP clinics. Self-treatment was more common in patients with lower levels of income. Affordability was the reason for 30–47% of the respondents to seek care from public health care facilities and for 35.2% from drug sellers, while credibility or confidence in the provider prompted some patients to seek treatment from private clinics.

The average treatment cost per ADL episode (n = 108) was Rs 22.21 ± 53.84 (US$ 0.46 ± 1.12). It was 5.66 ± 19.03 (US$ 0.12 ± 0.40) for males and 17.23 ± 64.88 (US$ 0.36 ± 1.35) for females. The mean treatment costs per ADL episode in different study areas and with different treatment sources are given in Table 1. They were in the range of Rs 20.68 ± 27.74 (US$ 0.43 ± 0.57) to 24.09 ± 27.05 (US$ 0.50 ± 0.56). However, treatment costs were much higher at private medical practitioners: 77.28 ± 91.07 (US$ 1,61 ± 1.89) (Table 1). Nearly 44% of the total expenditure was incurred for medicine (Table 2).

Treatment seeking for chronic disease

Of 200 patients interviewed, 98 (49%) underwent treatment for chronic disease manifestations at least once during the 1-year period preceding the interview and all had incurred expenditure. Fifty-eight per cent of the

Table 1 Costs (in rupees) of treatment for ADL episodes in different study towns and with sources of treatment

Category	Mean treatment costs (SD)
Study area	
Cuddalore	24.09 (27.05)
Villupuram	20.68 (27.74)
Pondicherry	22.18 (67.84)
Treatment source	
Government run clinics/hospitals	10.08 (11.10)
Privare practitioners	77.28 (91.07)
Self-rreatment	2.40 (2.74)

Table 2 Distribution of treatment costs (in rupees) for ADL episodes (n = 108) and chronic disease (n = 98) with respect to input

	ADL patients		Chronic patients	
Input	Costs	Proportion of total (%)	Costs	Proportion of total (%)
Medicine	1069	44.6	1684	50.4
Travel	750	31.3	633	18.9
Doctor fee	370	15.4	700	21.0
Clinical tests	210	8.8	325	9.7

hydrocoele patients underwent treatment compared with 45.6% of the lymphoedema patients. The proportion of male and female patients who underwent treatment was 54.2% and 46.9%, respectively. Seventy-one per cent of the chronic patients (n = 98) preferred treatment from public health facilities, 26% from private practitioners and 3% underwent self-treatment. Seventy-one per cent sought treatment from government sources: 48% from the NFCP clinics and 23% from other government health sources. Affordability was the main reason for treatment at public health facilities and self-treatment from drug sellers, whereas accessibility was the major reason for seeking care from private clinics.

The overall (n = 200) treatment cost incurred by a chronic patient per visit was Rs 16.71 ± 62.36 (US$ 0.35 ± 1.30); for those who paid (n = 98) it was Rs 34.10 ± 85.90 (US$ 0.71 ± 1.79). Among those who paid, the costs for hydrocoele were Rs 66.06 ± 109.21 (US$ 1.38 ± 2.28); for lymphoedema, 26.91 ± 78.79 (US$ 0.56 ± 1.64). Males paid 36.97 ± 75.59 (US$ 0.77 ± 1.57) and females 31.66 ± 94.42 (US$ 0.66 ± 1.96). Nearly 70% of the costs were incurred on medicine and doctors fee (Table 2). Private treatment was more expensive at Rs 120.96 (US$ 2.52), in contrast with the cost of self-treatment, which was Rs 2.88 (US$0.06).

Discussion

Previous estimates on the economic burden of LF were based on studies conducted in rural areas. Similar information from urban areas is necessary because nearly one-third of the LF burden in India originates in urban areas (Rao & Sharma 1986). Our study showed that treatment is considerably more expensive in urban areas. For example, while 98% of the patients affected with ADL episodes underwent treatment and incurred expenditure in urban areas, only 62.84% of the patients underwent treatment and 51% spent on treatment in rural areas. Only 26.8% of the ADL patients consulted either qualified or registered medical practitioners whereas in urban areas for nearly 64.8% of the episodes, patients consulted the medical personnel. On average, per ADL episode, the patients spent Rs 2.35 (US$ 0.05) in rural areas (Ramaiah *et al.* 1998) compared with Rs 22.21 (US$ 0.46) in urban areas. While 75% of the chronic patients in rural areas consulted the doctor, about 49% did so in urban areas. Fifty-two per cent of the rural and 49% of the urban patients incurred expenditure on treatment. On average, each chronic patient spent Rs 16.71 (US$ 0.35) in urban areas compared with Rs 8.32 (US$ 0.17) in rural areas (Ramaiah *et al.* 1999).

The above data suggest that LF patients in urban areas spend more on treatment than patients in rural areas. Hence, the overall economic burden must be higher than the current estimates, which are based on only rural areas. However, in the total economic burden imposed by LF treatment costs account for 3.9% and the remaining burden is due to the loss of labour (Ramaiah *et al.* 2000). Therefore, updating the economic burden estimates requires data on treatment costs and also labour loss from urban areas. While our study provides information on the treatment costs in urban areas, further studies are necessary to understand the labour loss due to LF.

Government health facilities are the major sources of treatment for LF patients. Credibility (confidence) and satisfaction with the attitude of the provider and perceived benefits of the treatment as well as accessibility of clinics are the factors that prompted patients to seek treatment for ADL from private clinics. Affordability is the major cause for seeking treatment from public health care facilities and drug sellers. Morbidity management and alleviating the suffering of chronic patients is an important component of the LF elimination programme (Siem *et al.* 1999). Recently, new and effective strategies that focus on leg hygiene, elevation, exercise and other palliative care have been developed (Dreyer *et al.* 2000). The medical and paramedical personnel in the government health facilities and also private practitioners should be trained in these

measures, which are likely to provide better relief to the LF patients.

Acknowledgements

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Community Perception of Malayan Filariasis in the Rural Areas of Cherthala Taluk of Kerala State, South India

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ABSTRACT

Lymphatic filariasis, one of the major public health problems can be controlled with the active participation of the community. The human factors involved in the disease transmission are important. The knowledge on the community perception and practice is essential to develop community oriented control programmes. A descriptive study was conducted in the filariasis endemic area of Cherthala, Kerala State, India, to identify the level of people's perception on Malayan filariasis. Two methods namely, interviews and uncontrolled observation were used in the study. A total of 450 respondents (150 microfilaria carriers, 150 chronic patients and 150 normals) were interviewed. The study results showed that majority of the respondents (86.7%) were aware that the disease was caused by a parasite and 93.6% had awareness on transmission of the disease through mosquito bite. The knowledge on the preventive measures against filariasis was also high (78.2 %) among the sampled respondents. The strategy for community mobilization in filariasis control programme is discussed in view of high awareness.

INTRODUCTION

Malayan filariasis with an estimated 8.6 million infected persons is known to be endemic in many parts of Asia and is causing increasing concern to the Public Health experts.[1] India accounts for 20.2% of the global burden of malayan filariasis[2] with 3 million people at risk, along the west coast of Kerala.[3] Cherthala Taluk in Alleppey district is recognized as the hot bed of filariasis since 1855.[4] The disease has gained a strong foothold in Cherthala due to its unique topographic, ecological and socio-economic factors. This disease is caused by *Brugia malayi* parasite and transmitted by Mansonia mosquitoes which breed in close association with aquatic weeds that grow abundantly in the natural as well as man made water-bodies in this area. Control of this type of filariasis depends mainly on two measures (1) destruction of breeding sites and thereby controlling the emergence of mosquitoes which transmit this disease and (2) mass chemotherapy. The sustainability of any control programme needs people's involvement. For proper utilization of the existing facilities and participation in the

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control programme, awareness on the disease is a prerequisite.

In January 1986, Indian Council of Medical Research, through one of its National Institutes (ICMR), the Vector Control Research Centre, Pondicherry, started a 'Technology Mission Project' for the containment of filariasis. Intensive health education programmes were implemented in this area by the Vector Control Research Centre, through integrated disease/vector control programmes with active community participation. After ten years of implementation of these programmes by Vector Control Research Centre[5] in the study area, this study was carried out to ensure the awareness of the people on Malayan filariasis.

STUDY AREA

The study was carried out in Cherthala taluk, Alleppey district, Kerala. The total area of the taluk is 304 sq. km. Rural Cherthala is inhabited by middle and low economic groups. There are 95,875 households in this area with a population of 4,77,819. The urban population in this locality is 1,98,342 and the rural population is 2,79,477. Majority of the population is concentrated in rural areas of this taluk. Literacy rate of the area is as high as 82.96%.[6] This taluk is divided into 18 administrative units called panchayats and one municipality. The major occupation of the people in this locality includes agriculture, toddy tapping, coir industry and fishing. Coconut is the major crop and coir is the notable cottage industry. There are over 75,000 domestic ponds besides a number of canals/channels and vast areas of seasonal water collections providing a total surface area of about 16.50 sq. kms for vector (mosquito) breeding.[7] The ponds and channels are mainly used for irrigating the sandy terrain. They are also used for retting coconut husk for coir making. Apart from this, ponds are used for domestic purposes like bathing, washing, drinking, etc. These water bodies are heavily infested with floating weeds such as *Pistia stratiotes, Eichhornia crassipes* and *Salvinia molesta*. Mansonia mosquitoes lay their eggs in clusters in the under surface of fronds of these plants.[8] The larvae of this mosquito attach to the roots of the waterweeds for their oxygen requirement. The proliferation of mosquitoes is related to the presence of the weeds and the control of mosquitoes is possible only through the destruction of these weeds.

MATERIALS AND METHODS

A total of 450 respondents were selected for the study from 6 of the 18 panchayats using simple random method. The panchayats thus selected were Kadakkarapally, Pattanakkad, Kuthiathode, Kodumthuruth, Thuravoor and Kanjikuzhi. The endemicity rate in these panchayats ranged between 3.5% and 15.5%. Population varied from 2500-3000. From the sampled panchayats, 25 respondents were selected from each of the three categories of respondents namely microfilaria positive cases, chronic cases of elephantiasis and normal individuals. A semi-structured questionnaire was designed to collect information on perception of the community on the cause, transmission and control of the disease.

The schedules were pre-tested before the actual study was undertaken. The questions were in the order of demographic and socio-economic particulars of the respondent, knowledge on the term filariasis, cause of the disease as filarial worm, role of mosquito in the transmission, symptoms of the disease, diagnostic procedures, knowledge on the treatment procedures, course of medicine and frequency of treatment, knowledge on the preventive measures and on breeding sites of the disease transmitting mosquitoes. The data were organized and analyzed using epi-info statistical package.

RESULTS

All the respondents irrespective of infection were aware of the prevalence of the disease in the community and the local term for lymphoedema of the upper/lower limbs as "*Manthurogam*". Majority of the respondents were also aware that the disease was century old in this area.

Knowledge on the cause and transmission of the disease: The analysis of the data showed that a vast majority of the people (86.7%) was aware that filarial parasite was the cause of the disease. Only 13.4% of the respondents had misconceptions regarding the cause, as to drinking polluted water and due to the sandy terrain of the area. The percentage of people with misconceptions on the cause were comparatively high among the chronic patients than the other two categories. Regarding the transmission of the disease, 93.6% reported that the disease was transmitted from one individual to another through mosquito bite (Table 1).

Awareness on the symptoms of the disease: Fever with chills, body ache, swelling of the groins and recurrent oedema were reported to be the major acute symptoms by majority (76.7%) of the respondents. It was interesting to note that there was no notable difference in the knowledge on symptoms of the disease among the categories. This supports the fact that awareness among the people was very high in this area irrespective of infection in total, 78% of the respondents felt that without external manifestations a person could harbour the disease parasite. It is also interesting to note that significantly ($p<0.05$), higher proportion

Table 1: Knowledge on the transmission of filariasis in terms of number of respondents in relation to means of transmission under different respondent categories

Means of transmission	Mf carriers No. (%) *N= 150*	Chronic No. (%) *N= 150*	Normal No. (%) *N= 150*	Total No. (%) *N=450*
Inherited	2 (1.3)	7 (4.7)	1 (0.7)	10 (2.2)
Sleeping habits	4 (2.7)	8 (5.3)	7 (4.7)	19 (4.2)
Mosquito bite	144 (96.0)	135 (90.0)	142 (94.6)	421 (93.6)

Figures in parentheses denote percentage out of 'n'

of the microfilaria carriers (76.6%) were of this opinion when compared to normal individuals.

Knowledge on the preventive measures of filariasis: When asked about the methods of prevention from the contraction of filariasis, as many as 78.2% of the respondents could correctly mention one or more preventive measures against filariasis. From the vector point of view, 49.8% of the respondents knew about the association between weeds and vector mosquitoes and suggested clearing of vector breeding habitats as a preventive measure (Table 2).

This shows that general awareness on the role of mosquito breeding sites is high among the respondents. Personal protection was reported to be a preventive measure by 18.4% of the people. Selective therapy was suggested by 4.9% of the people and preventive treatment was suggested by 0.9% of the respondents. Even though avoiding persons with the disease is a misbelief, 4.2% of the respondents reported that this had to be followed as a preventive measure.

Knowledge on the diagnosis and treatment: Regarding the perception on treatment, among the acute and chronic patients, it was found that 96.7% of them had the knowledge on the drug given and the course of treatment and 55.4% felt that the drug had to be taken at regular intervals to prevent further development of the disease. Among those who did not have proper knowledge on the treatment procedure, normals constituted higher percentage 9/15 (60%) than the others. All the microfilaria carriers were aware of the

Table 2: Knowledge on preventive measures of filariasis in terms of number of respondents in relation to means of transmission under different respondent categories

Preventive measure	Mf carriers *N= 150* No. (%)#	Chronic *N= 150* No. (%)#	Normal *N= 150* No. (%)#	Total *N=450* No. (%)#
Clear breeding site of mosuitoes	80 (53.3)	59 (39.3)	85 (56.7)	224 (49.8)
Personal protection	31 (20.7)	36 (24.0)	15 (.10.7)	83 (18.4)
Blood test and treatment - Selective therapy	5 (3.3)	2 (1.3)	15 (10.0)	22 (4.9)
Avoid persons with the disease	7 (4.7)	1 (0.7)	11 (7.3)	19 (4.2)
Preventive treatment (Mass therapy)	2 (1.3)	0	2 (1.3)	4 (0.9)
Do not know	25 (16.7)	52 (34.7)	21 (14.0)	98 (21.8)

Figurs in parentheses denote percentage out of 'n'

blood examination as a diagnostic procedure for filariasis. This is because, all of them had undergone the procedure at least once. Among the chronic respondents, 86% of them could tell blood examination as a diagnostic procedure while it was 68.7% among the normals. All the microfilaria carriers and chronic cases reported that blood examination was to be done at night. Among the normals 74% were aware that blood smear should be checked at night hours while 2.5% did not respond to the question.

Source of information: Among the source of information regarding the etiology of the filarial infection, majority of the chronic patients got the information from others. About 54% of the microfilaria carriers also had known from others. Lessons learned from own experience were prevalent among the chronic patients (23.3%) as expected. However, reading materials were found to be the major source for dissemination of information, particularly among the normals (80%). When this was analyzed irrespective of the infection, 50% of the respondents reported to have gathered information from others and this followed by print media.

DISCUSSION

A vast majority of the people in the study area were aware of the disease and its cause, mode of transmission and methods of prevention. As observed in other diseases like onchocerciasis,[9] dengue[10] and AIDS,[11] the respondents recognized the clinical symptoms and the cause. While different studies concluded that people's knowledge on transmission of filarias was poor in different endemic areas,[12,17] the present study revealed majority of the respondents had the right perception on filariasis. A similar study on dengue, also showed that very high proportion of the community was aware of the disease and its transmission.[10] The reason was to the high literacy rate of the study population as observed in other studies[15,17,18] as well as the impact of the decade long filariasis control efforts of Vector Control Resear Centre, Pondicherry, in this area. A study conducted prior to health education campaigns among school children in the same study area showed that 70% of the students had misconceptions regarding the cause of filariasis.[19]

Majority of the respondents were aware that the disease-causing parasite could be present in humans without showing external clinical manifestation This was supported by the view that the microfilaria carriers who had taken treatment did not show any clinical manifestation.[20] Among the categories, microfilaria carriers were found to support this view more than the others. This could be related to their experience since all the microfilaria carriers were normally asymptomatic.[21] Knowledge was not found to be related to infection. The uninfected were found to be more informed on the disease than the patients with chronic clinical manifestations.

Majority of the respondents were aware of the preventive method of deweeding the domestic water bodies for preventing vector mosquito breeding. Awareness of personal protective methods was found to be low. More efforts to popularize the various personal protective

methods to prevent vector mosquito bites are needed.

The high levels of knowledge on the treatment procedure for filariasis is an added advantage, as majority of the patients may undergo treatment, and thus facilitate interruption of transmission from the sick. As chronic patients were found to have misbeliefs when compared to the other two categories, more attention should be paid in creating awareness among them regarding the transmission of the disease. Similarly the perception on the diagnostic procedure for filariasis was found to be low among the normals. So more efforts are to be made on the need of night blood examination and treatment.

As many of the respondents have gathered information on the disease through reading materials, it clearly shows that dissemination of information on prevention of disease will be effective if spread through press, which can get further channeled through exchange between individuals. Kerala being a highly literate state, educational programmes through print media will be successful.

Even though the community has good perception on the preventive and curative aspects of filariasis, disease control will be possible only if the knowledge they have acquired is put into practice. An effective component or a feeling about it and a behavioral component or a tendency to take action should follow a cognitive component or awareness on the disease.[22] There can be knowledge without right attitude and behaviour.

The presence of awareness on disease control will be fruitful in planning and implementing vector/disease control programmes for the target group. The requirements for the three different categories in relation to filariasis control vary considerably. The kind of appropriate information to be given to each group is different. So efforts should be made to prepare separate information package to address the different categories.

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that they do not invalidate the working hypothesis outlined in our original article [1].

Ginsburg feels that we have been selective in our use of the literature. However, there are good reasons for citing the work of Slomianny *et al.* (apart from the fact that we agree with them). Slomianny *et al.* have published five of the most recent papers on the ultrastructure of the hemoglobin (Hb) digestion apparatus in several *Plasmodium* spp. This is a large body of work, considerably more than any other group, and must position Slomianny *et al.* as leaders in the field.

We disagree with the assertion that there is no other direct evidence in favour of our hypothesis. At least two papers from other groups suggest that pigment can be seen in small cytoplasmic vesicles, as well as in the digestive vacuole (DV) [2,3]. For example, in Fig. 2 of Ref. [3], three small vesicles containing hemozoin (HZ) can be clearly seen adjacent to the DV. Neither do we agree that the appearance of vesicles containing undigested Hb inside the DV suggests that Hb digestion is confined to the DV. This occurs only after the parasites have been treated with high concentrations of chloroquine or ammonium chloride [4,5], suggesting, instead, that the drugs have inhibited Hb digestion in the transport vesicles (TV) and not in the DV.

Ginsburg raises some other interesting issues on the activation of proteolytic enzymes, possible osmotic effects resulting from Hb digestion and possible high local concentrations of ferriprotoporphyrin IX (FP) within the TVs. These are intriguing questions that demand further investigation. Nonetheless, it is clear that none of these issues poses a problem to *Plasmodium berghei*, which lacks a central DV and has no choice but to digest all of the Hb within its cytostomal vesicles [6].

What is lacking in Ginsburg's otherwise eloquent critique is any credible explanation of how the HZ crystals are initiated or how the DV membrane is protected from the damaging effects of FP. We believe that our membrane sacrifice mechanism provides an interesting and plausible hypothesis that lends itself to experimental testing.

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Strategic options for global lymphatic filariasis elimination

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The global elimination of lymphatic filariasis (LF) programme has been launched in many countries. Their strategy is to adopt mass, annual single dose (6 mg kg^{-1} of body weight) of diethylcarbamazine (DEC) administration, with or without albendazole (ALB), irrespective of the level of endemicity. Recently, it has been reported that mass treatment with a single dose of DEC (6 mg kg^{-1} of body weight) alone could be sufficient to interrupt LF transmission in areas with low intensities of infection and low prevalence in Egypt [1]. Mass screening of night blood-smears and selective treatment of infected individuals (standard course of DEC, 6 mg kg^{-1} of body weight, for 12 days) has been in practice in the Nile Delta region of Egypt for many years before launching the mass annual single dose of DEC. However, Reda *et al.* had not realized that the end result was a cumulative effect of selective therapy of infected individuals, followed by a mass annual single dose for the community, and they had assumed that these conditions apply to many other endemic areas around the world.

India alone accounts for ~38% of the total disease burden worldwide [2]. The facilities for detecting parasite carriers (microfilaraemics) and treating them with a standard dose of DEC are available in highly endemic areas and in urban areas covered by the National Filaria Control Programme (NFCP) (~10% of the total population at risk). Selective treatment is recommended for infected individuals [3]. For the majority of individuals in rural areas and low-endemic areas (which contributes to more than two-thirds of the total population at risk), DEC is intended to the community for the first time. This situation is also likely to occur in most other endemic countries.

One round of mass treatment with a single dose of DEC reduced the microfilariae (Mf) prevalence and intensity

by 31% and 70%, respectively, in Papua New Guinea [4], whereas two rounds of DEC reduced prevalence and intensity by 34% and 59%, respectively, in Tanzania [5] and four rounds by 62% and 74% [6], respectively, in South Arcot district of Tamil Nadu, India, and 48% and 65%, respectively, in Villupuram district of Tamil Nadu, India [7]. These studies all reveal that the mass annual single dose of DEC has a more dramatic impact on reducing parasite intensities than on parasite prevalence.

For the global LF elimination programme, a repeated mass annual single dose of DEC was recommended because this would lead to a reduction in the community microfilaraemiae load (CMFL), which would then facilitate interruption of transmission. The biggest challenge is to overcome the lack of community compliance, a problem in areas of low endemicity. To enhance compliance, ALB has also been added to the programme. However, in the real world, neither the programme managers nor the community in areas of low endemicity give priority to LF control and/or elimination and, as a result, DEC coverage and consumption is very poor under the mass annual single dose DEC programme. If we continue to depend on this strategy, the areas of low endemicity will continue to remain as low-grade transmission foci and, once this programme has stopped, resurgence of LF is likely.

Ideally, before it is too late, it would be wise to take stock of information on the impact of mass annual single dose DEC in all endemic areas where the LF elimination programme is implemented. Once these areas reached a low level of transmission, a small-spaced dose of DEC, perhaps in a medicated salt formulation, in addition to vector control, could be considered for complete cessation of transmission. This has to be worked out independently for different community settings, considering socio-economic characteristics and other logistics. This approach would help to reduce the CMFL and enhance community compliance because it also addresses the nuisance caused by mosquito biting. If planned properly, the global LF elimination could be achieved much earlier than the original target of 2020.

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Development of rapid assessment procedures for the delimitation of lymphatic filariasis-endemic areas

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Summary Lymphatic filariasis caused by *Wuchereria bancrofti* is a major public health problem in 73 tropical and subtropical countries including India. Delimitation of endemic areas is essential to plan control operations. The current method of night blood survey (NBS) for delimitation is cumbersome, time-consuming and expensive. Therefore, there is a need to develop assessment procedures which can rapidly delimit endemic areas. For this purpose we evaluated three procedures: direct interviewing of key informants using structured questionnaires, an indirect method of a self-administered questionnaires to key informants and physical examination by health workers for the presence of chronic filarial disease. Thirty rural communities in a filariasis-endemic region in Cuddalore district in Tamil Nadu State in southern India constituted the study population. The determination of filariasis endemicity in the village communities assessed by the above procedures was compared in terms of rapidity, specificity, sensitivity and cost with the microfilaria rate and disease rate obtained by night blood sample survey and clinical examination by physicians. Prevalence score, control preference score and weighted mean number of cases with filarial disease per village were calculated using the key informant questionnaire techniques. While the prevalence and control preference score showed low sensitivity and moderate specificity, weighted mean number of cases showed high sensitivity and moderate specificity in identifying endemic villages. The prevalence of disease as determined by the physical examination of a sample population by health workers was highly sensitive in identifying communities endemic for filariasis. The degree of association between the disease rates estimated by physician and trained health workers was significant ($r = 0.56$; $P < 0.05$). These observations suggest that the weighted mean number of cases per village obtained through key informant techniques may be considered at a primary level to crudely identify endemic areas, followed by physical examination by health workers for filariasis, since it is relatively cheap and rapid.

keywords lymphatic filariasis, RAP, epidemiology, distribution, microfilaraemia, disease, cost effectiveness

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Introduction

Lymphatic filariasis caused by *Wuchereria bancrofti*, *Brugia malayi* and *B. timori*, transmitted by a number of mosquito species, is a major cause of morbidity, affecting all ages and both sexes. About 1.1 billion people are at risk of infection worldwide, accounting for 20% of the world's population (WHO 1997). India alone contributes about 47% of global prevalence of chronic patients and 39% of the population at risk of infection (NFCP 1995; WHO 1997). Economic loss in India has been estimated at US$ 1.5 billion every year (VCRC unpublished data; Ottesen *et al.* 1997).

The disease results in severe morbidity and globally is the second most important cause of permanent disability (WHO 1995). While acute episodic adenolymphangitis causes severe physical suffering, chronic disease such as lymphoedema and hydrocele causes permanent disfigurement and psycho-social problems (Pani *et al.* 1995; Gyapong *et al.* 1996; Ramaiah *et al.* 1996b; Pani & Srividya 1997). It results in loss of work, productivity, direct and indirect economic loss and functional impairment (Pani *et al.* 1995; Ramaiah *et al.* 1996c; Ramu *et al.* 1996, 1997a,b). Consequently, the disease is a significant impediment to socio-economic progress of the endemic countries. Filariasis has been identified as a potentially eradi-

cable disease (CDC 1993; WHO 1997) and the 50th World Health Assembly 1997 passed a resolution that 'elimination of filariasis as a public health problem' should be considered a priority by member states (WHO 1997). Delimitation of endemic localities is an essential prerequisite for planning control or elimination programmes. However, lymphatic filariasis is one of the few diseases for which information on the current global distribution and prevalence is not available. For an example, the estimate that in India about 412 million people are exposed to the risk of filarial infection (NFCP 1995), mostly to the bancroftian form (about 95%; Michael *et al.* 1996); is based on survey data collected between 1955 and 1995, and therefore does not reflect the current situation. Currently used delimitation surveys such as the night blood survey (NBS) for microfilaria and clinical survey are cumbersome, costly and require skilled manpower (Das *et al.* 1995). Therefore, it is necessary to develop alternate Rapid Assessment Procedures (RAP) for the delimitation of filarial endemic areas which are not only fast but also reliable, cheaper and acceptable to the community as well as the programme personnel.

We evaluated three procedures: direct interview of key informants using a structured questionnaire, an indirect method of a self-administered questionnaire to key informants and physical examination by health workers for chronic filarial disease manifestations. The disease endemicity at the village level obtained through these proposed methods was compared with two gold standards, the microfilaria (mf) rate obtained through night blood examination and the disease rate determined by clinical examination by physicians. For the cost-effectiveness analysis, the proposed methods were only compared with NBS, since this is the method used by the national programme authorities for delimitation purposes.

Theoretical basis for development of RAP

So far there is no single index which can be uniformly used to denote the filarial endemicity of an area. The basis or criteria for declaring a given area or community as filariasis-endemic are still unclear, although establishing the presence of indigenous local transmission could be ideal. Currently, the endemicity level is mostly described in terms of infection and disease prevalence rates determined by NBS and disease surveys by physicians. But the interpretation of these two indices is complicated by the dynamics of infection and disease at individual and community level. At the individual level, it is well known that most clinical cases are amicrofilaraemic and most microfilaria carriers are asymptomatic (Brabin 1989; Q3 Pani *et al.* 1990). Thus the two methods detect different groups of individuals afflicted with filariasis. At the community level, while in areas where filariasis is recently introduced, infection prevalence may be high compared to disease prevalence, in stable endemic areas both infection and disease prevalence could be moderate to high. Therefore, it is not expected that two indices would correlate with each other in all endemic situations. In spite of these inherent difficulties arising out of the complex natural history and epidemiology of the disease, one could assume that areas where clinical cases are detected (if migration is excluded), infection will be prevalent, since clinical disease is a consequence of infection, not *vice versa*. In other words, detection of disease could suggest the presence of infection at community level. Therefore, for the development of RAP, the proposed procedures use the communities as the unit, and also detection of disease rather than infection. As a measure of efficacy, the ability of a procedure to identify the endemic communities is compared with that of the gold standard methods. This approach is further supported by the fact that detection of the clinical disease in an area is relatively simple compared to parasite detection in the blood. In the analysis of data, the relationship between infection and disease was also examined to substantiate the assumption that disease can indeed reflect infection at the community level. However, any approach which targets the detection of disease alone is likely to miss communities where filariasis has been introduced recently, recording low levels of infection prevalence but no disease. In view of this, we propose to conduct RAP for detection of disease first and subsequently surveys for detection of infection in those communities negative for disease. This paper investigates the suitability of certain methods for detection of disease only in the initial stages.

Materials and methods

Selection of study villages

According to the protocol, only villages with population between 500 and 2500 were to be included. Thirty villages in two administrative blocks adjacent to Pondicherry within a known endemic district of Cuddalore in Tamil Nadu State of south India were randomly selected from the 62 villages satisfying this criterion. The total population of the study villages was 42 100 (range: 507–2424). The mf and disease rates of the district were 0.5% and 1.02%, respectively, according to the National Filaria Control Programme (NFCP). No antifilarial measure had been implemented in the study villages.

Gold standard methods

In each study village, 10% of the population from randomly selected households (by systematic random sampling) were examined for microfilaria by NBS. All individuals in the selected households were included for blood examination.

ratio of cost to effectiveness. The most cost-effective method is the one with the lowest cost-effectiveness ratio.

Statistical analysis

Sensitivity and specificity were first analysed (using EPIINFO) to see which one of the proposed procedures was appropriate in identifying endemic areas compared to night blood mf survey and clinical examination by physicians, using the village as an unit. Regression analysis was used for the degree of association between the prevalence/preference scores and mf rate/disease rate; disease rates estimated by health workers and physicians and mf rate; and disease rate estimated by health workers and physicians.

Results

Gold standards

Blood samples were collected from 4929 persons in 30 villages and examined for mf. The number of samples collected per village ranged from 90 to 273. Seventeen villages had no mf carriers and the mf rate in the remaining 13 villages ranged from 0.40% to 5.00% (Table 1).

4692 individuals were clinically examined for filariasis (range: 100–245 persons per village). The prevalence of the disease (lymphoedema and hydrocele; either one or both) was recorded in 25 of 30 villages. The disease rate ranged from 0.50% to 4.70%.

Rapid Assessment Procedures

187 KIs were interviewed directly using the structured questionnaire (QDIR) and 167 of these also answered the self-administered questionnaires (QIND). About 70% of the KIs were male; government employees (56%), farmers (27%) and businessmen (7%) constituted the majority.

Table 1 Range of filaria prevalence rates (in percentage) as obtained by various procedures

	Prevalence		
	By NBS (n = 30)	By Physicians (n = 30)	By Health Workers (n = 30)
Microfilaraemia	0.40–5.00 (13)		
Disease		0.5–4.7 (25)	0.7–11.5 (26)
Hydrocele		1.4–13.4 (23)	1.2–14.8 (25)
Lymphoedema		0.4–2.3 (8)	0.6–5.2 (10)

Figures in parentheses indicate number of villages positive out of the surveyed; n, Total number of villages surveyed; NBS, Night Blood Survey.

Prevalence and control preference scores

Using the direct KI questionnaire method (QDIR), filariasis (hydrocele and or lymphoedema) was recorded as a priority health problem in only 6 of 30 villages and in these the score ranged between 0.14 and 2.00. The preference score for control of filariasis was zero in all the villages. As far as the disease prevalence is concerned, only in 2 villages KIs were unanimous in saying that there was no filariasis case in the villages. In the rest, the disease prevalence rate ranged between 0.1% and 6.1%.

Employing the indirect self-administered questionnaire method (QIND) method, filariasis was recognized as a health problem in 14 villages, with prevalence scores ranging between 0.20 and 1.71. Interestingly, by this method preference for the control of filariasis was recorded in 9 villages (score range: 0.20–0.86). The disease prevalence rates ranged between 0.05% and 1.3% in 27 villages and only 3 villages were said to be free of filariasis. One of these was also declared as nonendemic by direct method. In both direct and indirect approaches, body ache and fever were scored high in terms of prevalence and control preference in 29 villages, reflecting the community perception of health problems.

Physical examination by health workers

The number of individuals physically examined by the health workers was 2990 (range: 56–178 per village). Of these, 1430 (47.8%) were males and 1560 (52.2%) were females. Disease prevalence was recorded in 26 villages and it ranged from 0.70% to 11.50% (Table: 1).

Statistical analysis

Sensitivity and specificity of the KI questionnaire methods in identifying positive villages using prevalence and control preference score for filariasis was poor by both direct and indirect approaches (Table 2). When the disease rate (using weighted mean number cases) was considered, a very high sensitivity of 100% was obtained for the direct method, against 85% for the indirect method. The specificity of both questionnaire approaches was relatively low (Table 2).

Reliability of both questionnaire methods using prevalence and control preference scores in identifying disease positive and negative villages (as determined by physician) was poor as shown by low sensitivity and specificity (Table 2) compared to CEPH. Interestingly, however, when the weighted mean number cases was used for identifying disease positive and negative villages, a high sensitivity was recorded both by the direct (92%) and indirect (88%) methods, although using the same index, the specificity was very poor (< 20%) in both approaches.

About 20 µl of blood was collected from each individual of the sample population by finger prick method between 2000 and 2400 hours. The blood smears were processed and examined the next day in the laboratory and the mf counts recorded.

In each study village, 10% of the population (aged 15 years or older) was also clinically examined by physicians for signs and symptoms associated with lymphatic filariasis, particularly lymphoedema and hydrocele. The sampling design was similar to NBS but independent.

Direct and indirect key informant questionnaire techniques

In each village, 6–7 key informants including government employees (school teachers, postal staff, public health personnel, etc.), business people and farmers were identified and information on filariasis was collected using a structured questionnaire in the local language. It consisted of questions on filariasis and also on the general health status of the community in order to eliminate any possible bias towards filariasis. Two approaches (direct and indirect) were used for collecting information. In the direct method, health workers interviewed key informants using a structured questionnaire (QDIR), and in the indirect method, the same informants completed the questionnaire by themselves (self-administered; QIND). In the indirect method, questionnaires were sent to key informants through the local PHC staff, to be filled in and returned within a week. Both methods were used in all 30 villages. To minimize any influence of one method over the other, QDIR was conducted in first 15 villages and QIND in the other 15 villages at the beginning of the study. At the end of the study, i.e. after one year, QIND was carried out in first 15 villages and QDIR in the other half. The same key informants were used in a given village for both methods.

Obtaining information on filariasis

To find out whether filariasis was prevalent in that area, the following two key questions were asked:

- What are the important diseases prevalent among adults in order of decreasing importance?;
- What are the diseases preferred by you for control in order of decreasing importance?.

The answers given by the KIs to these questions were ranked in the order of decreasing importance. The mean of the rank for a particular disease (by all the KIs of a given village) was taken as 'prevalence' and 'control preference' scores for that particular disease for the village. To calculate the filarial disease rate of the communities under study, another question was asked:

- Do you know anyone suffering from filarial disease (hydrocele and or lymphoedema) in your village? If so, how many?.

The number of cases given by each KI was weighted by the village population figures given by him or her and the weighted mean of cases was calculated for each community. This mean was used to calculate the disease rate of that village through these methods.

Physical examination by health workers for chronic disease manifestations (PEHW)

To estimate the disease prevalence, those households selected for NBS were re-visited by trained health workers and all the available adults (≥ 15 years of age) in the households were examined for chronic filarial manifestations such as hydrocele (scrotal swelling) and lymphoedema (swelling of limbs) in men, and lymphoedema in women. The estimates of filariasis indices obtained by these three procedures were compared with those determined by the gold standards, to assess their rapidity, reliability (in terms of specificity and sensitivity) and relative cost effectiveness.

Cost-effectiveness

The cost of various inputs under different activities for each approach was computed taking into account relevant parameters. The wages for personnel, cost of consumables such as questionnaire forms, medicines, blood lancets, stationery and other relevant field consumables under each approach were recorded separately. The transport cost for each approach was worked out separately as a product of the total number of kilometers traveled and the running cost per kilometer. Existing goods such as vehicles, microscopes, computers, etc. which can be used for more than one year were considered capital goods. For these, the depreciation cost was computed using an annualization factor table (Creese & Parker 1994).

A cost-effectiveness measure incorporating cost, rapidity and efficacy (using sensitivity and specificity data as given below) was derived to compare the cost per unit effectiveness of the methods per village. Rapidity of a method was based on the mean number of man-days required for processing one village by that method. The efficacy of the method was the measure of its discriminatory power to detect infected communities as estimated by the ratio of sensitivity to specificity of the method. Effectiveness was calculated by weighing efficacy inversely by rapidity. Thus, for a given efficacy, a more rapid test (requiring less number of man-days) was considered to be more effective. The combined impact of cost and effectiveness for each method was determined by the

Table 2 Comparison of Gold standards with RAP in terms of sensitivity, specificity and predictive values

Gold standards (parameter used)	RAP	Parameter used	Sensitivity (%)	Specificity (%)	Positive predictive value (%)	Negative predictive value (%)
NBS (mf rate)	Vs QDIR	Disease rate*	100	12	46	100
	Vs QIND		85	6	41	33
	Vs QDIR	Prevalence score	15	77	33	54
	Vs QIND		46	53	43	56
	Vs QDIR	Preference score	NA	NA	NA	NA
	Vs QIND		23	65	33	52
	PEHW	Disease rate*	85	12	42	50
PECL (Disease rate)*	Vs QDIR	Disease rate*	92	0	82	0
	Vs QIND		88	0	82	0
	Vs QDIR	Prevalence score	12	40	50	8
	Vs QIND		44	61	85	18
	Vs QDIR	Preference score	NA	NA	NA	NA
	Vs QIND		32	80	89	19
	PEHW	Disease rate*	92	40	89	50

*Disease rate includes both hydrocele and lymphoedema; NA, Not applicable.

When the village positivity with respect to the disease rate as estimated by health workers was compared with mf rate and disease rate by physicians, both had a relatively high sensitivity but a low specificity (Table 2).

Prevalence and control preference scores for filariasis obtained through KI questionnaires had no significant association with the mf rate or with the disease rate determined by the physicians. Neither did the disease prevalence rate obtained using weighted mean number of cases have any significant association with mf rate or disease rate as determined by physicians. The relationship between total disease rate (inclusive of both hydrocele and lymphoedema) estimated by physicians and the mf rate was significant ($r = 0.40$; $P < 0.05$) (Figure 1). The association between total disease rate estimated by physicians and health workers was also significant ($r = 0.56$; $P < 0.05$) (Figure 2). Though the total disease rates estimated by clinicians and health workers were significantly correlated, the hydrocele rates alone did not show any such association.

Relative cost-effectiveness of various techniques

The average cost per village as calculated for night blood survey, clinical examination by physicians, physical examination by health workers, direct questionnaire and self-administered questionnaire methods was US$ 57, 39, 17, 17 and 14, respec-

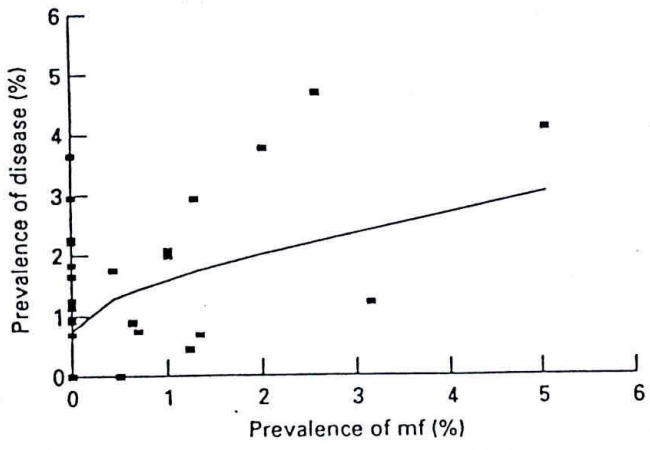

Figure 1 Relationship between mf and disease prevalence (as estimated by clinicians).

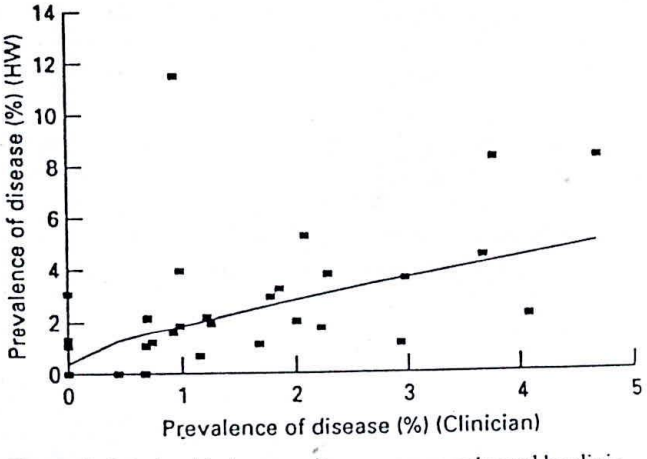

Figure 2 Relationship between disease rates as estimated by clinicians and health workers.

Table 3 Cost effectiveness ratios of RAPs

RAP	Cost per Village (in US $)	Cost per Village (in Rs.)	Cost relative to NBS	Rapidity (man-days)	Efficacy†	Effectiveness‡	Cost effectiveness ratio*
NBS	57	2431.07	1	9.7	1.00		
CEPH	39	1671.58	0.69	5.3	1.20	0.23	7267.72
PEHW	17	749.09	0.31	3.3	0.96	0.29	2583.06
QDIR§	17	710.94	0.29	3.5	1.15	0.33	2154.36
QIND§	14	593.03	0.24	1.5	0.90	0.6	988.38

† Sensitivity/(1-Specifity); ‡ Efficacy* (1/Rapidity); * Cost/Effectiveness; § For these two methods, disease rate based on the weighted mean number of cases has been considered.

tively (Table 3). For the KI questionnaire techniques, only the sensitivity and specificity values obtained by using weighted mean number of cases were used (Table 2).

It is obvious that the cost of the proposed procedures was significantly lower than that of conventional night blood survey or clinical examination by physicians. Cheapest was the self-administered indirect questionnaire (QIND) method (24% of the cost of NBS), followed by the KI direct questionnaire (QDIR) method (29% of NBS) and physical examination by health workers (PEHW: 31% of NBS). The cost of clinical examination by physicians was 69% of NBS (Table 3). However, with regard to efficacy in detecting positive villages in relation to NBS, the most efficacious (discriminatory) method was CEPH followed by QDIR, PEHW and QIND. Table 3 indicates that the cost-effectiveness ratio was highest with QIND followed by QDIR (considering the disease rate using the weighted mean number of cases), PEHW and CEPH.

Discussion

Rapid Assessment Procedures (RAP) have been successfully used in the control of onchocerciasis (Ngoumou *et al.* 1994) and schistosomiasis (Lengeler *et al.* 1991a,b, 1992). In high endemic areas of Ghana (Gyapong *et al.* 1996) and India (Ramaiah *et al.* 1996a) reliable estimates of the burden of lymphatic filariasis in the community were obtained by anthropo-sociological assessment criteria comprising direct key informant interviews, focus group discussions, routine reporting from health facilities and self-administered questionnaires. The results were compared with data from standard epidemiological surveys (Gyapong *et al.* 1996). A random examination of adult males for hydrocele also provided a good correlation with the community microfilaria prevalence in Ghana. An analysis of data collected on different variables showed a significant correlation between vector infection rate and infection prevalence in humans, suggesting that the former can be used as an indicator in the rapid assessment of infection prevalence in humans (Pani *et al.* 1997).

Among the three proposed procedures assessed in this study for their utility in the delimitation of filariasis-endemic areas, the questionnaire method, though very rapid and acceptable to the community, was neither sensitive nor specific enough using the prevalence and preference scores. Overall, the study area recorded low prevalence of infection and disease; and quite expectedly, the prevalence and preference scores for filariasis as obtained by the key informants turned out to be low, since common ailments such as fever and body ache happened to be of more concern to the general populace. Hence, the high preference for control of these ailments was recorded. Therefore, the suitability of use of the prevalence/preference scores and disease rate by KI questionnaire approach in areas with different endemicity levels needs further investigation. By the same KI questionnaire approach (both QDIR and QIND), the information on the number of individuals filarial disease was relatively more useful compared to prevalence and preference scores, since the disease rate considering the weighted mean number of cases was reasonably sensitive in declaring communities positive/negative for filarial disease. Although the specificity was poor, considering the high sensitivity, the low cost, rapidity, simplicity and high community acceptance, the KI questionnaire method (using the weighted mean number of cases) could serve as a first-level rapid and crude delimitation tool in filariasis endemic communities in large areas.

Since a significant correlation was found between the mf rate and the estimate of disease prevalence by physicians and also between the estimate of disease prevalence by physicians and health workers, it can be deduced that trained health workers can estimate the prevalence of the disease by physical examination of a sample population. Though there was a significant association between the overall disease rate (including both hydrocele and lymphoedema) between PEHW and CEPH, the hydrocele rates determined by these two methods did not show any significant association. This may

be attributed to the tendency of over estimation of scrotal swellings as hydrocele by the health workers. Therefore, with better training, the capability of the health workers to correctly diagnose hydrocele cases (excluding nonhydrocele cases) could be enhanced.

It should be noted that all these proposed methods are wholly based on the presence of the clinical forms of the disease in the community. While using them for delimitation purposes, we may miss those areas which do not have disease but only infection as discussed under the basis for the development of RAP above. To overcome this difficulty, delimitation can be achieved by a three-stage procedure. In the first stage, the KI questionnaire method could rapidly screen areas for filariasis. Since its specificity is low, the areas classified as negative by KI method could include some positive communities (false negatives) which in the second stage should be screened by PEHW. This would identify all communities with clinical cases of filariasis (which are likely to have infection prevalence as well). In the final stage, the communities negative for disease by both KI questionnaire and PEHW method could be examined for infection prevalence using either a suitable and simple day human blood antigen kit such as the ICT kit (Weil *et al.* 1997) or a PCR technique with pools of mosquitoes (collected by simple traps). Following this stepwise procedure could not only save time and manpower, but tests for detection of infection or transmission (which are costlier) could be limited to the minimum number of communities. This could also enable us to stratify villages for deciding the best control option (either one or a combination of vector, parasite or morbidity control).

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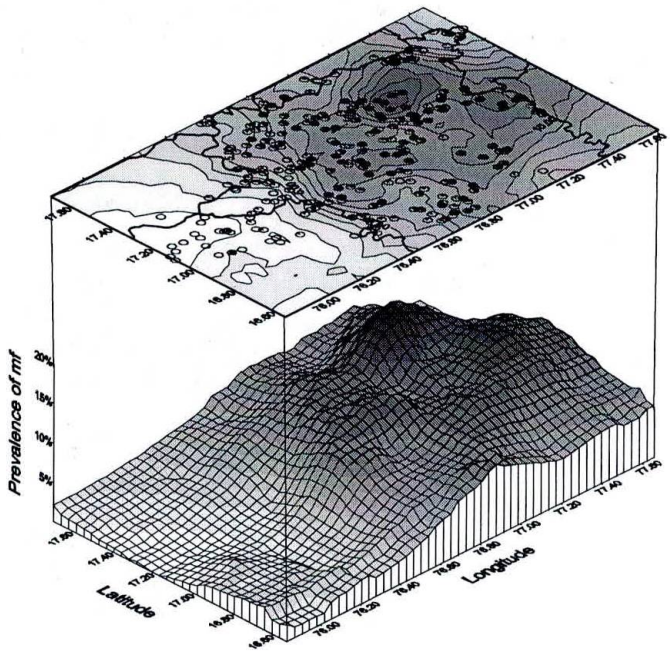
prepared during a protocol development workshop
held from 22-25 July 1997
in James Cook University, Townsville, Australia



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BY OUR SPECIAL CORRESPONDENT

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The two-day confluence of organisations working on public health, which started on Wednesday, will go on till Thursday. PHM officials said that with 700 volunteers from over 50 countries, it is being held as a run up to the World Social Forum.

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Participants are also expected to call for the disbanding of the WTO and regional agreements with similar characters as well as the withdrawal of key WTO agreements like the trade-related aspects of Intellectual Property Rights, which promotes the commercialisation of healthcare. Dr Narayan explained that the most important point on the agenda will be the reintroduction of the 1978 Alma Ata Declaration of "health for all."

CONTENT

Introduction 1

Geographical distribution patterns of filariasis 2
- Size of filariasis foci 2
  - Ghana 2
  - Vellore district in India 3
  - Myanmar 4
  - Gulbarga district in India 4
- Preliminary spatial analysis 5
  - Myanmar 5
  - Gulbarga district in India 6

Proposed methods for Rapid Geographical Assessment of Bancroftian Filariasis 8
- Exclusion of areas 8
- Mapping of distribution of filariasis in remaining areas 8
  - Indirect questionnaire 9
  - RAP survey in a sample of communities 9

Field testing of the different methods 11
- Study objectives 11
- Study design 11
- Spatial analysis of endemicity patterns 11
- Analysis of costs and other resource requirements 12

References 15

Annex I: list of participants 16

Annex II: Interview of Key Informants 17

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1 Introduction

Lymphatic filariasis is a major public health problem in tropical countries. Recent estimates suggest that some 120 million persons are infected world-wide; 107 million with *Wuchereria bancrofti* and 13 million with *Brugia malayi.* The number of people with physical disabilities due either to lymphoedema and hydrocele or the newly recognised sub-clinical abnormalities of lymphatic and renal function are currently estimated at 43 million, with Bancroftian filariasis accounting for almost 40 million of these cases (Michael 1996).

The International Task Force on disease eradication identified lymphatic filariasis as one of six potentially eradicable disease since there are now good enough tools to combat the disease (CDC, 1993). The World Health Assembly at its meeting in May 1997, passed a resolution on the elimination of the disease as a public health problem through mass treatment of affected populations and appropriate management of clinical cases.

In order to initiate any disease control programme based on mass drug distribution, one needs to understand the geographical distribution of the disease in the affected countries in order to know where to target mass treatment. Unfortunately, data on the distribution of lymphatic filariasis are not widely available primarily because the standard procedures for determining which communities are affected are cumbersome, time-consuming, expensive and very intrusive. In areas where the parasite exhibits a nocturnal periodicity, parasitological examinations need to be done at night. This becomes logistically cumbersome to organize, and communities often refuse to co-operate.

Recent epidemiological studies in Ghana suggested that clinical filarial disease is a good proxy measure of the levels of endemicity of filariasis.(Gyapong et al, 1996). This findings has since been validated in a WHO coordinated multi-country study (WHO 1998a). On the basis of the results, the study participants recommended the use of clinical examinations of a sample of adults as a rapid method to assess the community burden of the disease.

Even with these new rapid assessment methods, it would be very time-consuming and expensive to do filariasis surveys in all potentially endemic communities in order to determine the geographical distribution of lymphatic filariasis. However, given the clustered distribution of filariasis in most parts of the world, it may be possible to develop methods which allow the estimation of the distribution of filariasis on the basis of surveys in a limited spatial sample of communities. Such a method has already proven very valuable for onchocerciasis control in Africa (Ngoumou et al 1994, WHO 1998b).

Building on this idea, the participants in the workshop reviewed spatial patterns of lymphatic filariasis, designed different methods for rapid geographical assessment of Bancroftian filariasis, and formulated a plan for field-testing of the proposed methods.

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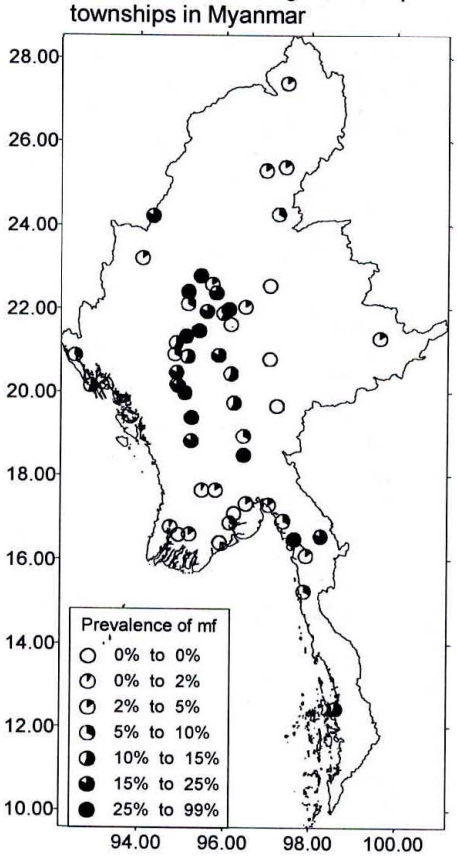
2.1.3 Myanmar

Filarial antigen prevalence data from 70 randomly selected Townships spread over the 14 Districts of the country were analysed. The prevalence of antigenaemia was determined using the ICT filarial antigen detection kit on blood samples from 100 blood donors from each site. The majority of the blood donors were residents of the main towns in the selected Townships. The map of the prevalence data suggests that the central dry zone is highly endemic (20-30 %) and that the northern, eastern and southern areas are less endemic or free from filariasis. (Map 3)

Map 3: Prevalence of filarial antigen in sample townships in Myanmar



2.1.4 Gulbarga district in India

After the workshop, an analysis was done of microfilarial prevalence data for the district of Gulbarga in Karnataka State in India. These data were the result of a night blood filariasis survey undertaken in Gulbarga district between 1985 and 1988. The sampling was done following the guidelines of the National Filariasis Control Programme (NFCP). Of the villages sampled, 262 villages whose geographical coordinates were available were plotted on a map using GIS. The results are given in Map 4. They show that filariasis in endemic throughout the study area except in the West where there the prevalence of microfilaraemia was zero in most sample villages.

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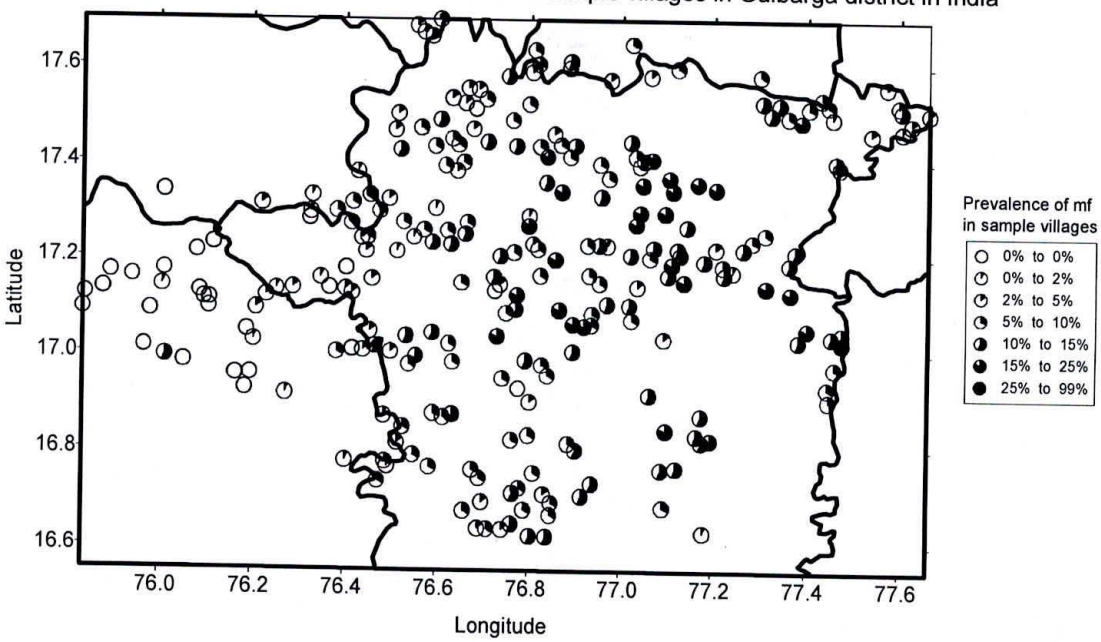
Map 4: prevalence of microfilaraemia in sample villages in Gulbarga district in India



2.2 Preliminary spatial analysis

2.2.1 Myanmar

A preliminary spatial analysis of the Myanmar data indicates that there exists a spatial autocorrelation between the prevalence data, with the semivariance being smallest for villages which are located closest to each other (see Figure 1). An exponential model was fitted to the semivariance data and this model was used in so-called kriging to estimate the prevalence of antigen for each point of a grid overlaying the country. In kriging, the prevalence at a grid point is estimated by a weighted average of the observed prevalences, with the weighting factor depending on distance and spatial autocorrelation as defined by the semivariance model. The results of this estimation are given in Map 5 which shows the contour lines for the estimated prevalence of antigen.

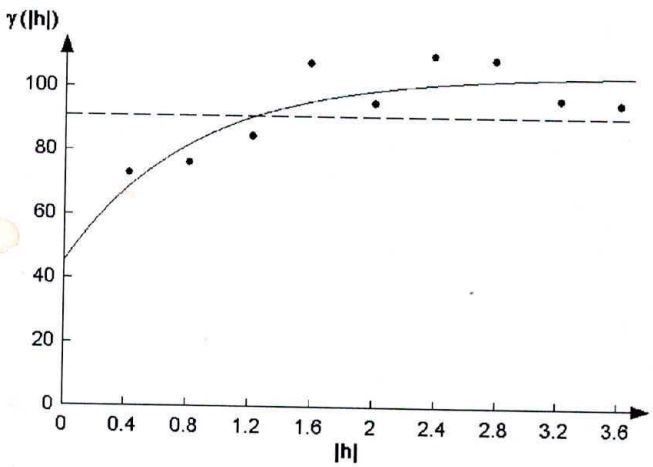


Figure 1: An omnidirectional semivariogram showing increasing semivariance, • , of antigen prevalence with distance till a distance of 2 when • levels off. (the units of distance, h, are in degrees; 50 km is approximately 0.48 degrees). The fitted curve represents an exponential model with nugget 45, range 2.5 and sill 59.

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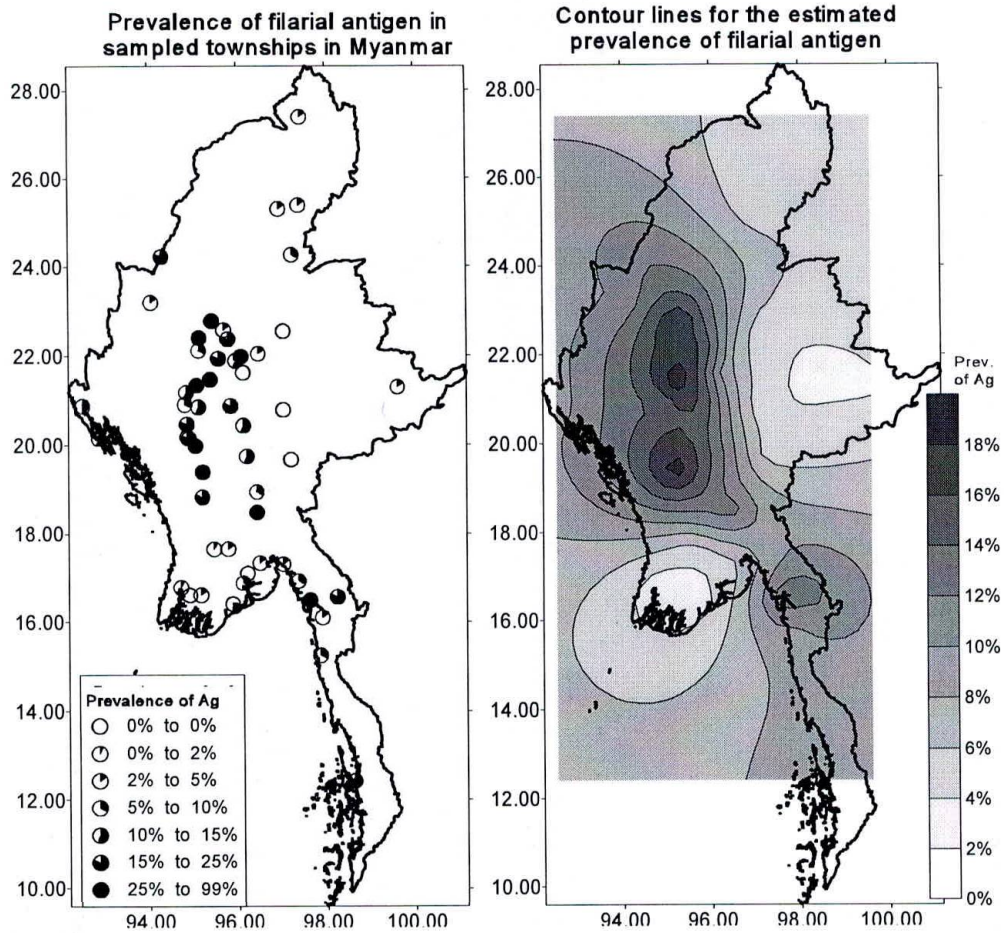
Map 5: estimated prevalence of filarial antigen in Myanmar



The contour map shows the existence of a major filariasis focus in the centre of the country, and an area which is virtually filariasis free in the South-West. In the remaining part of the country, the sample townships were widely dispersed with some isolated townships being located at more than 250 km from the nearest sample township. With such distances between the samples, interpolation becomes questionable and there appears to be a need to extend the sample coverage of the country before a complete map of the distribution of filariasis in Myanmar can be made.

2.2.2 Gulbarga district in India

The detailed data for Gulbarga district enabled a full spatial analysis of the endemicity pattern of Bancroftian filariasis. The semivariogram analysis showed a strong spatial autocorrelation of the prevalence of microfilaraemia (see Figure 2). The fitted linear variogram model was subsequently used in kriging and contour analysis. The results are shown in Map 6 which combines a two-dimensional plot of the observed prevalence of mf and a countour plot for the estimated prevalence with a three-dimensional surface plot of the estimated prevalence of microfilaraemia.

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BY OUR SPECIAL CORRESPONDENT

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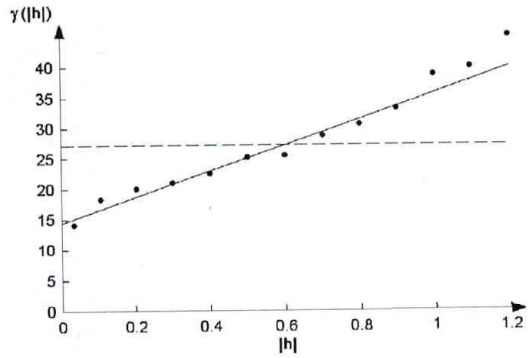
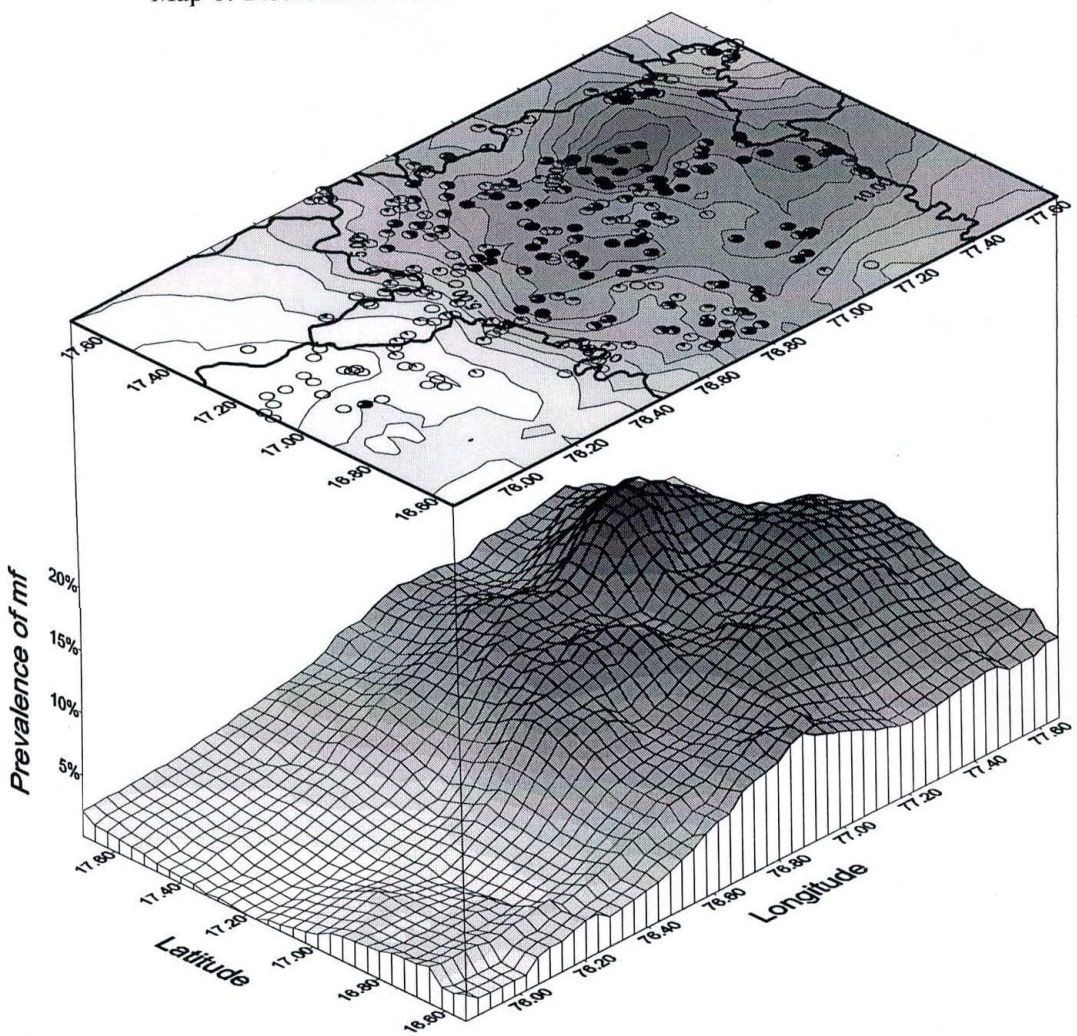


Figure 2: An omnidirectional semivariogram for Gulbarga district showing an increasing semivariance, • , between village MF prevalence with distance, h. This pattern indicates a strong spatial autocorrelation between the prevalence data. The fitted linear model has a nugget of 14.56 and a slope of 21.336

Map 6: Distribution of Bancroftian filariasis in Gulbarga district, India



The pattern for this district is very clear, with high endemicity in the centre and the East, a peak prevalence around 77.2° E and 17.3° N, and a gradually declining prevalence of microfilaraemia to the West. Large scale treatment appears indicated for most of the district. These prevalence contour

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maps should be very useful to control managers by clearly indicating priority areas for control and by facilitating objective decision making on the boundaries of treatment areas.

3 Proposed methods for Rapid Geographical Assessment of Bancroftian Filariasis

Although the available data from the above countries was limited, it was noted that in all cases the filariasis foci were fairly homogeneous and quite large with a diameter of at least 50 km. This preliminary finding was used in the design of proposed methods for Rapid Geographical Assessment of Bancroftian Filariasis (RAGFIL). These methods and the steps involved are described below.

3.1 Exclusion of areas

The first step is to evaluate regions of endemic countries, defined by ecological or other features, in order to identify areas where there is no filariasis or where there are only sporadic infections which are unlikely to be significant for control. Such regions will be excluded from further rapid assessments. Although it is important not to exclude endemic areas for which control is appropriate, criteria should be specified for each country to exclude regions where the chance of significant lymphatic filariasis is acceptably low. Criteria for exclusion may include negative results in prior screening, and demographic and ecological features that are incompatible with the parasite, vector, and disease (e.g. uninhabited areas, deserts, national parks, very high mountain ranges etc).

Historical survey data may be sufficient for inclusion of an area. Such data may include either published literature or data from national programme activities. The latter may be obtained from national health documents, reports from international sources (eg, sources from WHO; TDR documents currently under review; South Pacific Commission Reports in New Caledonia, and relevant published literature, such as Sasa's *Human Filariasis*). Older sources (eg, before 1950) should be sufficient for classifying regions as possibly endemic, and recent epidemiological data from proper studies may be acceptable as community survey data.

3.2 Mapping of distribution of filariasis in remaining areas

In known endemic or possibly endemic regions (ie, those not excluded), Rapid Geographical Assessment of Bancroftian Filariasis (RAGFIL) will be done. Two different RAGFIL methods are proposed:

(i) a method in which a large sample of villages will be surveyed indirectly using questionnaires directed at key informants, and

(ii) a method based on surveys using rapid assessment techniques (viz, health worker examination for hydrocele and lymphoedema, or possibly antigen screening with the ICT card) in a small sample of communities selected on the basis of a geographical grid (grid spacing 50 km, subject to validation).

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Short communication

Effect of lymphatic filariasis on school children

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Keywords: Lymphatic filariasis; Education; Children

Lymphatic filariasis affects about 120 million people globally and 22 million of them are children below 15 years of age (Michael et al., 1996). Lymphatic filariasis has been listed as the second leading known cause of disability (World Health Organization, 1995) and the disease impairs mobility, day-to-day domestic and economic activities (Evans et al., 1993; Gyapong et al., 1996; Ramaiah et al., 1997) and sexual and marital life (Dreyer et al., 1997). The disease is estimated to be responsible for the loss of about 0.63% of per capitum GNP in India (Ramaiah et al., 2000). Most socioeconomic studies on filariasis involve adults and the problem of filariasis in children has received poor attention. In our studies on filariasis in rural areas, we have seen many children (5–15 years) affected with filariasis.

Five hundred and six people were detected with chronic manifestations of filariasis in two villages near Pondicherry in South India. They included 28 individuals (26 boys and two girls) below 20 years of age and clinical examination for chronic disease (Pani et al., 1991) and inquiry on occurrence of acute disease (Ramaiah et al., 1996) confirmed the presence of chronic and/or acute disease manifestations in them. Seventeen (16 boys and one girl) of the 28 were affected with acute and/or chronic disease while they were in school and 11 after they had completed or discontinued school education. Of those 17, 14 were affected with hydrocele and two (one girl and one boy) with slight lymphoedema of the lower limbs and one with frequent episodes of only acute adenolymphangitis (ADL). Five of the 14 boys affected with hydrocele and one with lymphoedema also reported occurrence of ADL episodes. These 17 individuals were in the age group of 10–15 years (Table 1).

We have collected qualitative data through in-depth interviews (Taylor and Bogdan, 1984; Ramaiah et al., 1997) with all the 17 individuals to assess the impact of the disease on their education. Social stigma in terms of shame, embarrassment and ridicule involving enlarged genitals forced a 15 year old boy studying tenth standard in a local school to give up his education. While

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in school, he used to conceal his disease condition by wearing loose garments. The convention of going to secondary education classes (11th and 12th standard) wearing trousers, which he thought would reveal his disease condition and attract ridicule from his fellow students forced him to give up his education. Lu et al. (1988) also documented the stigma associated with hydrocele. Another boy, while studying eighth standard, used to suffer frequent ADL episodes coupled with transient lymphoedema of lower limbs. Severe fever and malaise associated with ADL episodes (Ramaiah et al., 1996) forced the boy to abstain from school often. Angry reaction from a teacher to absenteeism from school made him to give up his education. In addition, six more pupils also reported occurrence of ADL episodes and hence absenteeism from school. All the seven boys with ADL felt that the disease impaired their performance in studies. The frequency of ADL episodes reported to be 2–12 per annum. The loss of attendance ranged from 2–3 days per episode. One boy told us that he used to get acute attacks suddenly and had to leave the class room abruptly.

The most common complaint among the pupils with hydrocele was pain in the scrotum, which got worse after walking or cycling, by which means the pupils go to the local schools. The pain and inconvenience also forced some of the victims to curtail playing and other extra-curricular activities. One boy reported precipitation of acute episodes following exertion caused by playing. The affected also felt anguish that they could not wear the dress of their choice. Physical comfort in scrotal area and concealment of the disease condition weighed more in choosing the dress.

Table 1
Clinical manifestations and impact of the disease in school children (10–15 year age group) in the study villages

Clinical manifestation/impact on education	Boys	Girls
Number of children affected while in school	16	1
Number with hydrocele	14[a]	NA[b]
Number with lymphoedema	1[a]	1
Number with only ADL	1	0
Number of dropped out of school	2	0
Number of frequently abstained from school	6	0

[a] Five hydrocele patients and the lymphoedema patient were affected with ADL also.
[b] NA, not applicable.

Epidemiological studies on lymphatic filariasis have not focussed on school children. However, prevalence of microfilaraemia (Sasa, 1976), acute (Ramaiah et al., 1996) and chronic (Pani et al., 1991) disease has been recorded in school age children. In our study, more boys were found with clinical manifestations than girls and most of the boys (14/16) were affected with hydrocele. This is in conformity with earlier observations that prevalence (Pani et al., 1991; Meyrowtisch et al., 1995) and risk of being affected with hydrocele (Chan et al., 1998) is significantly higher than that of lymphoedemea of limbs in the male population.

About 35% of the pupils drop out from primary and secondary level schools due to various reasons including ill-health in the study region. Bundy and Guyatt (1996) have discussed specifically the impact of parasitic infections such as intestinal helminths, malaria and dracunculiasis on children and their physical and mental development. Our data for the first time, throws some light on the effect of lymphatic filariasis on educational performance of school children. Unlike patients in higher age groups, no school age individual underwent surgical intervention for hydrocele in the study villages (Vector Control Research Centre, unpublished). This combined with lack of adequate and effective treatment methods for individual patients (Ottesen et al., 1999) may contribute to the progression of the disease in affected individuals. Thus, the overall impact of the disease appears to be very complex — poor educational achievement affects the quality of future life (Bundy and Guyatt, 1996) and the progression of disease causes sociopsychological problems (Dreyer et al., 1997). Therefore, this segment of the endemic population needs special attention and support. School-based interventions are cost effective and show greater impact on health status than many other types of interventions (Bundy and Guyatt, 1996). School based

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interventions may ensure better treatment coverage for the control of filariasis and educational gains also.

While the qualitative data gathered in this study provides evidence for the first time on the impact of the disease on school children, more detailed studies are necessary to quantify the impact on school absenteeism and educational performance of children.

Acknowledgements

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Community Development and Partnership Strategy for LF drug delivery in urban areas in India

Draft Research Protocol

Content

BACKGROUND 1

COMMUNITY DEVELOPMENT AND PARTNERSHIP STRATEGY (CDPS) FOR LF DRUG DISTRIBUTION IN URBAN AREAS 2

- PROCESS: 2
- DRUG DELIVERY 3

PURPOSE AND OBJECTIVES OF THE STUDY 5

- RESEARCH QUESTIONS 5
- PURPOSE OF THE STUDY 5
- STUDY OBJECTIVES 5

STUDY DESIGN 6

ANNEX 1: CONCEPTUAL FRAMEWORK FOR THE INTERVENTION STRATEGIES 7

ANNEX 2: COMMUNITY DEVELOPMENT 8

- DEFINITION OF COMMUNITY DEVELOPMENT 8
- PRINCIPLES OF THE COMMUNITY DEVELOPMENT METHOD 9

Background

Lymphatic filariasis is a major health problem in many countries of the tropical world. An estimated 1.2 billion live in areas endemic for the disease all over the wold while 120 million have one form of the disease or the other. India accounts for over 40% of global burden of the disease with an estimated 450 million people "at risk" of infection and 50 million already infected. The disease does not kill but can cause significant morbidity and impede productivity and economic development of affected communities.

However, recent advances in mapping, diagnostics and development of chemotherapy and monitoring tools have made it possible to plan for the elimination of the diseases. The World Health Assembly in 1997 passed a resolution for the global elimination of lymphatic filariasis by the year 2020. The global plan for elimination is based on the twin strategy of interruption of transmission for the prevention of new cases and alleviation and prevention of morbidity in individuals who already have the disease. Interruption of transmission is achieved through mass administration of single annual doses of either DEC alone or a combination of DEC and albendazole. The success of this strategy is dependent on achieving high levels of coverage in endemic communities (>85%) and sustaining such coverages for 5 to 7 years.

This strategy of single annual administration is currently being implemented in 13 districts on India on an experimental basis. A recently completed TDR sponsored multi-centric study showed coverages to be far below the expected levels at all study sites. This study was conducted primarily in rural areas and highlighted the need for advocacy and development of better delivery strategies for achieving high levels of coverages.

The National Control Programme envisages rapid expansion of the revised strategy of single annual dose based mass chemotherapy to over 100 districts shortly. This expansion will cover both rural and urban areas in the endemic districts. While a drug delivery strategy for rural areas has been developed and is being continuously modified no such strategy exists for drug delivery in urban areas.

Bancroftian filariasis is recognized as a disease of urbanization and there is a growing need to develop strategies for drug delivery to achieve high levels of coverages in urban areas. Urban populations also differ from rural populations in several ways. The presence of both organised and unorganized settlements requires a mix of approaches. In addition the problem of migration is more pronounced than in the rural areas. The higher levels of literacy and economy make these populations more demanding in terms of information and quality of services. Similarly the affluence of some urban communities makes them rely heavily on the private sector for the health needs. More importantly the health care system in urban communities lacks the infrastructure and the outreach that is found in rural areas. Thus urban drug delivery strategies which take into consideration these factors need to be developed well in time before the mass drug administration strategy is expanded to cover more districts and urban areas including large metropolitan cities.

Community Development and Partnership Strategy (CDPS) for LF drug distribution in urban areas

During two protocol development workshops, the challenges for LF mass drug administration (MDA) in urban areas in India were reviewed. Furthermore, experiences with selected community development programmes in some of the study sites were discussed. Based on the review, the workshop participants designed a framework for a Community Development and Partnership Strategy (CDPS) for LF drug distribution in urban areas. It was hypothesized that this CDPS strategy might overcome some of the current major obstacles to effective MDA in urban areas, and at the same time contribute to community and health sector development.

The participants noted that the available information was limited and that the proposed design was still provisional. A proper scientific situation analysis would need to be undertaken in the study areas to provide a sound evidence base for a final design of the intervention. Hence, the CDPS strategy defined below should at this stage only be seen as a provisional framework that will guide the situation analysis. The final design of the intervention, and the decision how much emphasis to give to community development, will be made on the basis of the evidence to be collected during the situation analysis.

According to the provisional CDPS framework, the strategy will have the following elements.

Process:

1. **Stakeholders involvement** in planning and decision making
   a. Preparatory discussions with the municipality
   b. Creation of Steering Committee (MHO, journalist, social worker, women group rep, NGO, elected rep)
   c. Sensitization of stakeholders
   d. Exploratory local stakeholders meetings (councillors and community members), to discuss needs for LF drug delivery
   e. Stakeholders meetings at Municipality level

2. **Advocacy**
   a. General advocacy campaign addressing both the endemic population as well as providers, implemented through municipality

3. **Initiating Community Involvement**
   a. Planners and implementors have to get acquainted with the community first before commencing their work and make a study of the general characteristics of the local community

b. Community profile needs to be prepared with the community as a preliminary document
c. Identification of places, days and time for organising community meetings, local community leaders who would organise the meetings and enlighten the community on various aspects of the plans are the preliminary exercises
d. Before commencing any planning any MDA activities, general discussion with the community is necessary to find out its receptivity

4. **Partnerships** for mobilization, resource contribution and drug delivery. The following partnerships are essential:

i) Private practitioners and traditional healers

- Private practitioners and traditional healers have to be approached by the program planners and the implementation of plans have to be explained to them so that they are enlightened and their endorsement is assured
- Private practitioners and traditional healers have to be requested to educate and enlighten the community on its participation in planning and implementation (compliance)
- Provide necessary informative literature in private hospitals and clinics for dissemination to the people

ii) CBOs

- Prepare a list of CBOs/NGOs/VOs already existing in the community and find out their activity plan
- Prepare a list of office bearers of all the CBOs
- CBOS have to be sensitised to the LF elimination programme
- Provide necessary informative literature to all these organisations for dissemination

iii) Inter-sectoral partnerships

- Identify and list relevant institutions, organisations and field offices of all government depts (central, state and local), private sector
- Identify the heads of these institutions and their manpower as well as other resources
- They have to be sensitized to the LF elimination programme
- At all stages of formulation & implementation of plans these institutions/ organisations have to be involved

Drug delivery

This CDPS process should result in local decision making and planning for drug distribution to be executed by one or more of the groups below:

- Health workers
- Community volunteers / schools (students)
- Private practitioners

Drug distribution will involve the use of family drug delivery cards

Purpose and objectives of the study

Research questions

- What are the main determinants for the low treatment coverage in urban areas, and which factors make MDA more difficult in urban than in rural areas
- Can these problems be overcome by the application of the CDPS strategy or alternative strategy designed to address the specific problems in urban areas.
- Can such a strategy significantly enhance the perceived need of, and support for LF treatment among all stakeholders, e.g. the community, the health workers, the municipality officials.
- What level of treatment compliance can be achieved through the application of such an alternative strategy.
- Is effective application of the alternative strategy possible using the existing human resources at the municipality and community level, and if not, what else is required.
- Is the strategy cost-effective for achieving the required coverage in urban areas (taking also into account the contributions by different partners, incl. the community)

Purpose of the study

To develop and test alternative innovative strategies for mass drug administration, which would achieve the desired high treatment coverage in urban populations necessary for elimination of LF.

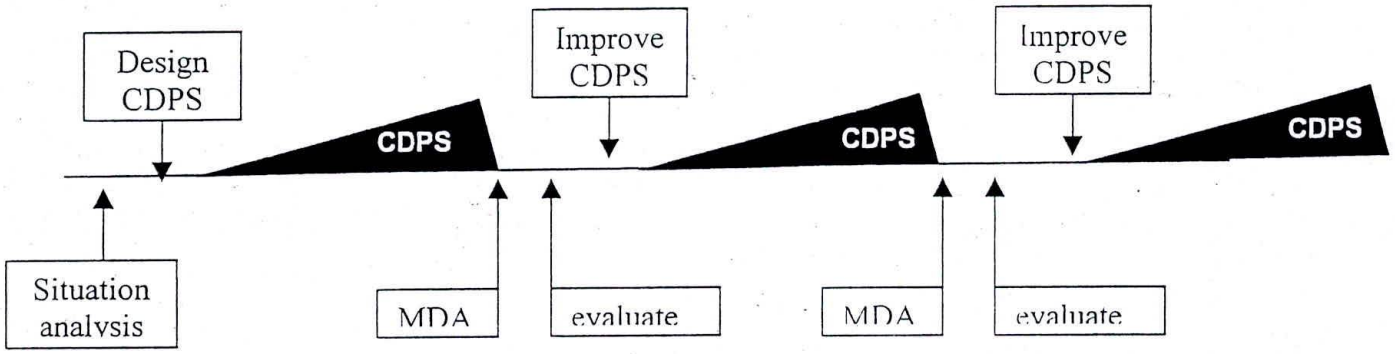
Study objectives

1) To identify the mean determinants of the low treatment coverage in urban areas, and which of these factors are particularly important in urban areas.
2) To determine for the principal socio-economic strata of the urban community their priority health & development needs, their knowledge of and importance given to LF, and to determine the potential for involvement of other stakeholders in MDA and identify opportunities for linkage to other health & development activities
3) To develop and implement an intervention strategy that addresses the challenges for MDA in urban areas, building on the CDPS framework or an alternative framework developed on the basis of the research findings on the above two objectives.
4) To evaluate the impact of this intervention strategy on perceived need of, and in enhancing support for, MDA amongst all stakeholders including the community, health workers, municipal officials
5) To describe the drug delivery process as developed by the stakeholders, and to assess its strengths and weaknesses

6) To evaluate the treatment coverage (consumption rate) achieved with the new strategy, and to assess whether after three years of intervention it reaches the desired level of treatment coverage with DEC/Alb that is required for elimination of LF.
7) To determine the feasibility of implementation of the new stategy using existing human resources (health and other sectors) at the municipal and community level.
8) To document the contributions made by various stakeholders and to determine the cost-effectiveness of the new strategy.

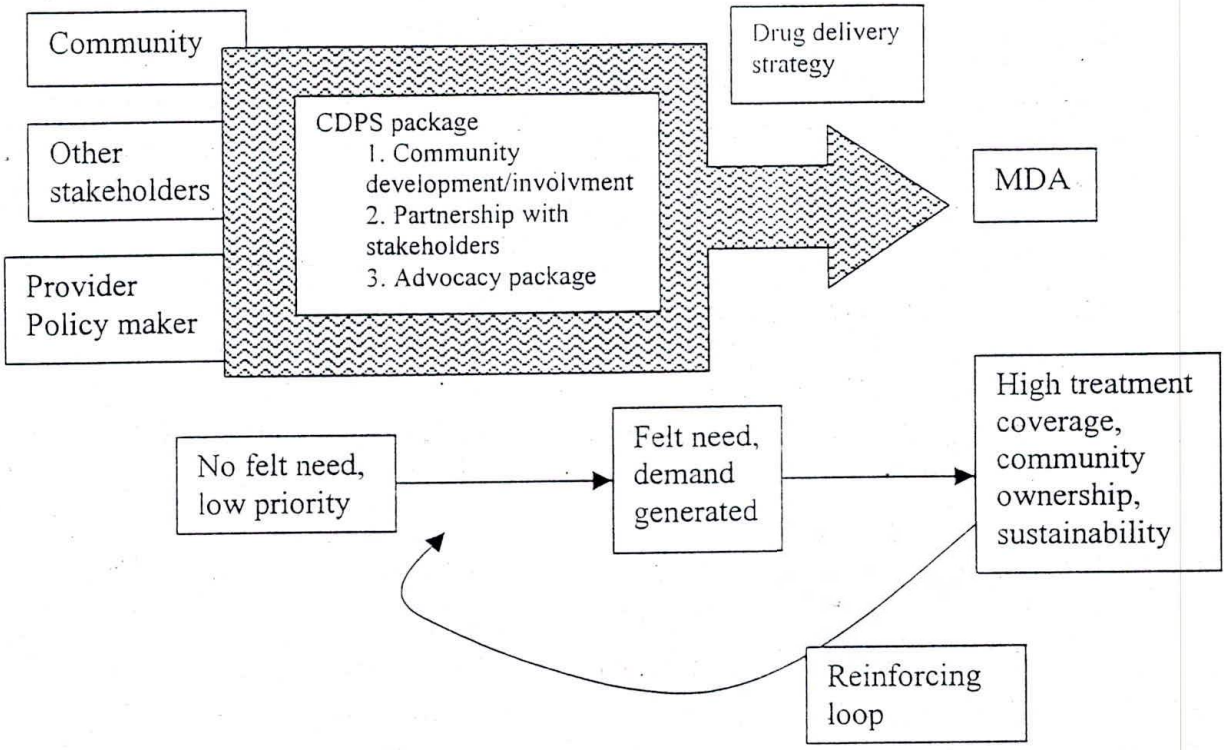
Study design

The study will be implemented at 3 sites –Varanasi (implemented through NICD, New Delhi) and Tamil Nadu and Orissa implemented through ICMR. The National Filariasis Control Program has plans to extend the revised strategy of mass annual drug delivery program to include about 100 districts endemic for LF. The study area will be selected from these districts.



A situation analysis will be undertaken in all study areas to provide the evidence base needed for the design of the final intervention strategy (CDPS or modified strategy). The situation analysis will at the same time provide some of the baseline data needed for later evaluations. The intervention will be implemented annually. An evaluation after the 1st round of MDA will assess improvements in perceptions and felt needs for LF elimination as well as assess treatment coverage. The interventions will be reinforced and an evaluation will be done after the 2nd round of MDA. Trends in felt need, demand generation for LF elimination, as also treatment coverage will be. A final evaluation will be done at the end of the 3rd round of MDA to determine the changes in treatment coverage, which can be attributed to the interventions.

Annex 1: Conceptual Framework for the Intervention strategies



As part of the strategy, through a continuous interaction and negotiation process, the community will be conscientized and a felt need for elimination for LF will be generated. This will be achieved using the community development approach as described in the Stakeholder Partnership Strategy. The municipal bodies will be simultaneously and also subsequently approached to generate a political will and commitment towards LF elimination using advocacy strategies. This may result in a collaborative planning and implementation of the MDA strategies jointly by the community and providers. This process will increase community participation and result in high treatment coverage essential for LF elimination. The process is repeated before each MDA round resulting in a reinforcing loop, which increases community ownership and sustains the high treatment coverage.

Annex 2: Community development

All over the world, three-fourths of the global population live in small communities in rural and remote areas. The rest of the population live in urban and metropolitan areas. In the implementation of development programmes in various sectors such as agriculture, education and health etc. governments and local authorities are playing the lead role the formulation and implementation of the programmes. However, success in implementation has not been to the desired extent. This is largely due to the fact that people and communities are not involved at the stage of identification projects, formulation of the plans and implementation of the schemes. Unless people are involved from the beginning of identification and formulation of welfare and development schemes, community participation can not be guaranteed. Hence, community development methods are advocated to achieve greater success in the implementation of the development schemes and higher realization of the objectives of the programmes. How this could be done is essentially a basic requirement in formulating and implementing schemes.

Communities are aware of some needs, which are called as felt needs. There are needs which have to be fulfilled to improve the quality of life of community about which communities are not aware of. In respect of these needs development planners and field workers have to create an awareness of such non-felt needs in the communities and generate initiatives and participation of the comminutes in implementing schemes for fulfillment of such needs. Creating community awareness and new needs which are basic for better living, creating conditions and an environment for community decision making, developing capacities for community management in the formulation and implementation of schemes enabling communities to contribute resources – physical, material and financial – and developing community leadership for guiding and implementing the schemes, enabling community to find out what are the forms of assistance, technical and financial, require from outside and creating people's organizations which would assume responsibilities for meeting the needs of the community or the basic components of the community development process. This method is equally applicable in any sector of development for the formulation and implementation of schemes. It has to be realized that if the community is not actively involved at the state of the formulation of schemes its participation will not be effective during the course of implementation of schemes. Programme planners as well as field workers have to be conscious of this fact while performing their functions. The community development process is equally applicable both to rural and urban areas.

Definition of Community Development

Community development is a movement defined to promote better living for the whole community with the active participation, and if possible, on the initiative of the community, but if this initiative is not forthcoming, by the use of the techniques for arousing and stimulating it in order to secure its active and enthusiastic response to the movement.

Principles of the Community Development method

- Involve the community right from the beginning of the planning process and get their inputs
- Planning should first take care of the felt needs and priority needs of the community
- Planners should also create awareness among the community on the needs meant for bettering their lives if the community is not already expressing these needs
- Planners should address all the needs of the community in a holistic manner
- Planners and others from outside the community should only play the role of indirect leaders (facilitators) and work through community leaders who are acceptable to the community
- Planners have to work through the existing community groups such as women's groups, youth clubs, religious groups, VEC etc.
- In implementing the plans, the planners have to facilitate the community contribute physical, financial and material resources possible by it and then supplement it with outside technical and financial assistance
- All decision making has to be made by the community and not by any outside agency on behalf of the community

Development & testing of new strategies for mass drug distribution for lymphatic filariasis elimination in urban areas.

Principal investigator: K.P.Ramaiah,
Project no. A10310

Development and evaluation of community development & partnership strategies for drug delivery for control of LF in urban areas of Orissa.

Principal investigator: B.V. Babu.
Project no. A10320

Objectives and Instruments for the Baseline Survey

Overall Objective

To explore and identify opportunities within urban communities, which would help design innovative urban-specific intervention strategies for mass drug administration for elimination of lymphatic filariasis.

Specific Objectives

1. To describe the demographic, socio-economic, political and cultural structure and relationships within the community
    a. Study the age/sex/educational/occupational/religion/caste/kinship and social networks of community residents
    b. Understand the formal and informal structures for decision making for health and development issues.
    c. Study formal and informal channels of communication
    d. To identify subgroups requiring special intervention relevant to the development process towards MDA.
2. To assess the felt needs of the community (including health needs)
    a. Felt needs include the priorities as expressed by the community members for health and development
3. To identify stakeholders, understand their roles and assess their perceptions towards Lymphatic Filariasis, Mass Drug Administration, drug related issues, and their potential involvement in the development process towards Mass Drug Administration.
4. To identify and understand functioning of various ongoing health and development processes / activities (resource mobilization) carried out by GOs/NGOs/CBOs/private sector in the urban community.
5. To assess the knowledge and perceptions of the community to LF and their perceptions and experiences (if any) with MDA.

For the purpose of the study, the urban community is categorized into four settlement patterns based on socio-economic status, infrastructure and health seeking behavior variations viz.

1. high income area
2. middle income area
3. low income area (slums)
4. hutments

Information Framework

Specific Objectives	Variables	Source	Method
(1) To describe the demographic, socio-economic, political and cultural structure and relationships of the various communities within the urban areas Age/sex/educational /occupational/religion/caste/kinship and social networks.	Age- <2 years, 2-4,5-14, >15, Sex, Education, Occupation, Religion, Caste, Economic Status (SC/ST/BC/MBC/OC) Description of political, administrative structure # of Cinema Halls, Schools, Hospitals, Industry, Trade centers, Festivals Morbidity Pattern/rates	Census 2001 HMIS BPL records Morbidity Data Research study reports, Data source of Government / NGO / local bodies Education dept records Anganwadi records	Review of secondary data
Formal and informal structures for decision making (includes elected reps, religious /caste associations, family level) for health and development issues.	Listing socio-cultural, religious institutions, individuals, relationships, decision-making processes, roles, interests in community programs.	Elected reps (municipal councilors, MLAs), Govt officials (health /non-health), local bodies. Formal/informal groups – Religious /Caste associations, Elected Reps etc.	KI interviews
Formal and informal channels of communication	Radio/ Television/ Computer/ Telephone Ownership, Internet Café usage, News Paper readership, Cultural Troops Cable TV viewership, informal communications, meetings of associations, groups etc.	Households Stakeholders (as above) Secondary data sources on TV viewership etc.	HH survey KI interviews Review of secondary data
To identify subgroups requiring special intervention relevant to the development process towards MDA.	List vulnerable groups, assessing needs, differentials in access to developmental / health benefits, any refusals to participate in community programs, how they can be involved in community programs.	Any special group identified during interviews with stakeholders	FGD
(2) To assess the felt needs of the community (including health needs) Felt needs include the priorities as expressed by the community members for health and development	List and prioritize felt needs, identify and describe individual and community level efforts to address those felt needs, describe attempts to link up with local body authorities, describe efforts at resource mobilization	Stakeholders in the 4 SE strata of the community SHG, women's groups	Free Listing (amongst KI) FGD

(3) To identify stakeholders, understand their roles and assess their perceptions towards LF, MDA and the drug, and their potential involvement in the development process towards MDA	List stakeholders. Map providers (formal and informal). Describe their roles in various program activities undertaken by them. Understand their perceptions about LF (burden in community, causative factors, transmission, preventability, treatment seeking behavior, stigma etc), perceptions towards MDA strategy (concept of mass treatment, healthy people taking drugs, side effects, perceived benefits, sustainability of MDA etc.). Assess their potential involvement in MDA in future, roles and responsibilities, how to link up with MDA program. Assess involvement in terms of human resources, finance, logistics etc.	Elected reps (municipal councilors, MLAs), Govt officials (health , non-health), local bodies. LIG-slum leaders MIG/HIG-secretaries of society, resident welfare associations, prominent citizens. Service organizations, NGOs, CBOs. Public/pvt health care providers.	Review of secondary data (for entire city/towm) FGD (for community from 4 SE strata) KI interviews (for NGOs, public/pvt health care providers)
(4) To identify and understand functioning of various ongoing health and development processes / activities (resource mobilization) carried out by GOs/NGOs/CBOs/private sector in the urban community.	NFCP experience. Identify past or ongoing health (NFCP, leprosy elimination, malaria control, AIDS prevention program, pulse polio or development activity), describe community involvement in planning, decision making, implementing, resource mobilization, evaluate degree of community ownership	NFCP official Key functionaries from the formal health and non-health sectors who participated in the activity, local body officials	Case study KI interviews review of records
(5) To assess the knowledge and perceptions of the community to LF and their perceptions and experiences (if any) with MDA.	Knowledge, perceptions of LF, transmission, causation, prevention, perceived risk of filariasis, perceptions about effectiveness, perceptions of MDA in terms of delivery of drug and health benefit. Health seeking behavior. Willingness to participate in future MDA. Prevalence of elephantiasis and hydrocele	Households	Household survey

Sampling design:

1. Information from the sample should be representative of the each urban area of the study for Bhubaneswar site and a municipal zone for Chennai.
2. Based on the discussion and consensus in the group, it is proposed to divide the urban area in following four strata:-
   a) High income group
   b) Middle income group
   c) Slums
      i) Low income groups (LIG)
      ii) Hutments
3. While it is understood that LIG and Hutment are well demarcated and list can be procured from Municipal Authorities/ Slum department, such clear demarcation between HIG and MIG areas do not exist
4. For practicality, it is proposed that a purposive categorization of HIG and MIG may be done as under:-
   a) HIG- wards which have more than 60% of houses are HIG.
   b) MIG- wards which have more than 60 % MIG houses.
5. **Steps for selection of households from HIG and MIG strata**
   a) All the wards of the town should be categorized into HIG or MIG for sampling.
   b) Select randomly 2 wards from each strata viz. HIG and MIG.
   c) List all the streets/ mohallas/ colony.
   d) Select 5 of the streets/Mohalla/colony randomly from each ward.
   e) From each street/mohalla/colony select a random start point and then select 10 consecutive households.

6. **Selection of sample slums and households**
   a) List out all the wards which have slums
   b) Select 10 slums randomly.
   c) Get the list of registered households from Public Distribution System (PDS)/ electoral list.
   d) Randomly chose 10 households in each slum from the list to get a total household of 100.

Summary

Household surveys: 100 households to be surveyed per strata

Focus Group Discussions (FGD): 3 FGD from each strata

Interviews of Key Informants (KI): 6 from each strata

Sample design and size

Activities	HIG	MIG	LIG	Hutments
	2	2	NA	NA
Street	5	5	NA	NA
Slums	NA	NA	10	10
Households	10 per street	10 per street	10 per slum	10 per hutment
Total households	100	100	100	100
FGD	3-4	3-4	3-4	3-4
KI	6	6	6	6

Summary of work load

Households = 400
FGD at ward level = 12
Interviews of Key Informants = 24

The following qualitative techniques will be administered by each site in each of the 4 SE strata:

Focus Group Discussions: Each site will conduct **at least** 3 FGDs in each of the 4 SE strata for a total of **at least** 12 FGDs per site. Each site may conduct more FGDs till the stage of information saturation. The FGDs may be conducted amongst community leaders, members of different Community based organizations, women's groups, minority groups, as appropriate.

Indepth Interviews: Each site will identify and interview in-depth **at least** 3 key informants in each of the 4 SE strata, identified from within the community for a total of **at least** 12 key informant interviews per site. Each site may conduct more in-depth interviews till the stage of information saturation. Key Informants could be elected representatives, private practitioners, formal / informal community leaders, representatives / office bearers of community based organizations, representatives of formal charity organizations like Lions, other NGOs, etc.

Additionally, each site will identify and interview in-depth, local body officials (at the municipality level) as well as program managers (at the district / State level) who have been directly involved with the mass drug administration programs in the past.

Free Listing: A free listing exercise will be conducted with each of the Key Informants before the administration of the in-depth interview. A similar free listing exercise will be conducted with each individual of the FGD independently and not collectively before the beginning of the focus group discussion.

All information will be noted by the researcher on paper as well as recorded on tape wherever feasible after the written informed consent of the participants.

Instrument 1: Focus Group Discussions

Preparatory visit to community

- Make a visit 2-3 days before the actual day of FGD.
- With the help of the local leaders, enlist the FGD participants
- Indicate the venue, date and time of FGD and request their participation
- Explain the purpose of the FGD
- Moderator should participate in this activity

Guidelines for FGD

- The researcher goes to the community
- Identify and list all formal and informal groups (includes women's groups, self help groups, NGOs, CBO's, media, youth groups, associations etc)
- Choose at least 3 FGDs per strata

- 7-10 participants
- Homogenous groups in terms of sex, socio-economic background etc.
- One moderator and one note taker
- Orientation to moderator and note taker
- Record the discussion as back up to FGD
- Duration 1-1.5 hours

Issues to be covered during FGD:

1. Introduction by the moderator (Brief details on control of LF and drug distribution programme. Encourage free discussion)
2.1. Common diseases in the area
2.2. Perceived reasons for such diseases
2.3. Available health facilities
2.4. Treatment seeking behaviour (availability of health services for treatment and prevention, various sources of treatment, frequency of availing health services, satisfaction with health services etc.)
2.5. Preventive measures taken
3.1. Assessment of health needs in the community (deficiencies in health services with reference to treatment and disease prevention)
3.2. Assessment of other needs in the community
4.1. Perceptions on and attitude towards LF
4.2. Knowledge about transmission
4.3. Priority accorded to LF (in general and in relation to other diseases)
5.1. Knowledge about MDA
5.2. Past experience in MDA programme
5.3. Community's willingness to participate in planning and implementation
5.4. Community's expectation from GOs/NGOs/CBOs
6.1. Experiences of participating in any health/community development programme
6.2. Reasons for participation/non-participation

Instrument 2: Key Informant Interviews

Suggested Categories for the key informant interviews

1. Elected representatives/political leaders
2. Professionals-private/public practitioners and paraprofessionals
3. NGOs/CBOs/social workers/associations
4. Women's groups/ self help groups/youth groups
5. Local body officials (health and non health)
6. Local media

Identification of the key informant

Name, age, sex, education, position in the community; reasons for selection of the key informant. Based on preliminary exploration with the study community, identify knowledgeable/prominent persons across the categories for in-depth interview. The investigator may choose appropriately for each category.

Issues to be covered as appropriate in Key Informant Interviews

- Build rapport with general information about the nature and duration of work of the KI in the community, and his personal impressions about community activities.
- Free Listing of all the major problems faced by the community (no probing or prompting).
- Free Listing of all the important illnesses in the community (no probing or prompting).
- Ongoing developmental activities; the extent of community participation in health and development activities-extent and nature of participation; planning and decision making process; experience with these activities; suggestions for effective implementation - Explore with specific experiences.
- Past / ongoing efforts of government/local body for problems like malaria, filaria and dengue etc, sanitation, sewage disposal, and mosquito control, water supply etc. Any community initiated efforts for any of the above interventions. Explore for any partnerships initiated between government and other agencies in the community.
- The extent and nature of interaction among social groups- which are the dominant groups, any groups that are marginalized / not cooperative; describe any conflicts while implementing development programs in the community.
- Explore reasons for non involvement / participation of marginalized groups in health and development programs; suggestions to involve such groups for future activities.
- Wherever applicable, describe efforts / problems at community involvement in planning and implementation of MDA program for LF?
- Who distributed the drug in your area? Were they acceptable to the community? Describe the community attitudes towards drug distributors.
- Note instances of rumored or reported side effects following MDA. Explore for efforts by community / drug distributor to respond to side effects (who responded, what was done, was the response quick etc.)

(For fresh areas for MDA – explain to the key informant about the concept, nature and scope of MDA)

- Based on your past experiences in other developmental programs, probe for suggested strategies for involving the community in MDA (who could be the potential partners; in what

ways can the community be involved; who will be acceptable to the community as drug distributor etc.)
- Explain the necessity for even healthy people to take the drug. Probe for strategies / ways in which this can be done.

Specific issues to be addressed based on different types of Key Informants

Elected representatives
- To what extent was the KI involved/wish to be involved in the MDA program.
- Probe for ways how the KI will mobilize political support from various higher and lower levels.
- Probe for ways how the KI will mobilize additional human / material resources for the program.

Professionals and Para-professionals
- Attitudes towards MDA strategy and the effectiveness of single annual dose of DEC in eliminating LF.
- Explore for willingness to participate in the program and the nature of their participation.

Women's Groups/ Self Help Groups
- Probe for community acceptance of women from SHGs / women's groups as drug distributors
- Understand training needs and nature of support required for a drug distributor before, during and after MDA.

Media
- Impressions / attitudes towards the MDA concept.
- Probe for potential problems in MDA and how to address them.
- Explore for role that media can play to support the program.
- If there were problems in MDA in the past, suggestions for improvement.
- Explore for ways that the media can help motivate people to take the drug.

Interview of key functionaries involved in the MDA program in the past
- Build rapport with general information on the person's role and responsibilities and association with the MDA program in the previous rounds.
- Probe for details on his role in the planning and implementing MDA for his area.
- Probe for efforts to involving other non-health organizations and also the community – which groups were involved, in what capacity, how he enlisted their support etc.
- Probe for details of training imparted to the drug distributors – its quality, adequacy, problems in training etc.
- Probe for problems that he faced with implementing MDA and explore how they were addressed.
- Did all sections of the community accept the drug from the distributors? What were the reservations expressed? (probe the experience)
- Probe details of reasons for poor coverage/ compliance in the area and suggestions for improving compliance and greater involvement of the community

What are your rights?

Your Participation is voluntary. If you decide not to participate you can indicate it at the time that you are contacted for your consent. You can choose to discontinue your participation any time without assigning any reason

Do you agree to participate in this study?

By signing this form you agree that the information provided by you may be presented in whatever medium or format to appropriate persons / authorities. However, we assure you strict anonymity by delinking your identity from the information that you may provide. The information collected by you will be kept confidential at all times. A numerical code will be assigned to all study forms, not your name. Your identity will not be revealed in case of publication.

I have read this form or have had this form read out to me and have understood its contents.

Volunteer's name :_____

Signature :_____

:Interviewer's name : :_____

Signature : :_____

Informed consent

Why we would like you to participate in this study?

We would like you to participate in a study on filariasis conducted by _____ with support from the World Health Organization. We are interested in knowing your opinions, views about filariasis and the program initiated by the Govt of _____. This information will be kept strictly confidential but will help us improve on the present program of the govt to control filariasis. The disease filariasis, also known by other names such as elephantiasis and hydrocele when it involves the external genitalia, can be eliminated from our area if all people including healthy people (excepting pregnant women and infants below 1 year age, take a single dose of medicine once a year for the next few years.

We are inviting you along with approximately 500 other volunteers to share your experience about filaraisis and its control program or experience with participation in other community development programs. This information will help us design appropriate programs to control filariasis in our area

What will your participation consists of:

You will be asked to answer a series of questions / invited to join a group to discuss your experiences with lymphatic filariasis along with your health seeking behavior. These questions/discussions could include your views regarding filariasis, where you seek care, what test and medicines normally you and your community use for common diseases and how much time and money is spent by you and your community on these activities.

The questionnaire/discussion will take approximately 45 minutes to one hour. It can be administered at a time and place that is convenient to you.

How will you benefit for participation in this study:

The information that you provide will be extremely helpful in designing an effective control programme for lymphatic filariasis in urban areas. Only by understanding this process from your perspective can we evaluate the real benefit of various strategies that may be implemented in your area. In addition, your answering the questionnaire will allow you an opportunity to voice how you think the system could be improved.

DIS-7B-26

No. 1-1/2002/NAMP (NFCP)/ TASKFORCE/LFE

Govt. of India
Dte. of National Anti Malaria Programme,
22-Sham Nath Marg,
Delhi – 110054.

Date: 25/01/2002

Subject: Meeting of the National Task Force for Lymphatic Filariasis Elimination (LFE) held on 21st December 2001, New Delhi – Minutes Regarding

Dear Sir/Madam,

Please find enclosed a copy of the approved minutes of the above stated meeting held under the Chairpersonship of Dr.(Mrs.) Ira Ray, Addl. DGHS, Government of India on 21/12/2001 at Resource Centre, DGHS, Nirman Bhawan, New Delhi for favour of information.

Yours faithfully,

(V.K. Raina) 25/1/02
Dy. Director
N.A.M.P.

To

1. Dr. P.K. Das, Director, VCRC, Indira Nagar, Pondicherry-605006
2. Dr. (Mrs.) Usha Baveja, Director, NICD, 22-Shamnath Marg, Delhi-110054
3. Dr. S.K. Kar, Director, RMRC (ICMR) Chandrashekharpura, Bhubnehswar-751023
4. Dr. P Krishnamurthy Director Public Health and Preventive Medicine, DMS Complex, 259-Anna Salai, Chennai-600006 Tamil Nadu

Contd. 2.....

5. Dr. Gayatri Sharma, Director General Health Services, Dte. of Health Services , Jawahar Bhawan, Lucknow
6. Director Health Services, Department of Health and Family Welfare, West Bengal,Writers Building, Calcutta-700001
7. Dr.H.K. Das. Director of Health Services, Head of Department Building, Bhubneshwar-751023
8. Dr. Srinivasa Sharama, Director of Health Services, Sultan Bazar, H yderabad-500095
9. Dr. V.K. Rajan, Director of Health Services, Thiruvanthapuram, 37, Kerala
10. Dr. Geeta Prasad,Director in chief, Department of Health Services, New Secretariat Building, Patna-8000002
11. Dr. Madhuri Sharma, Dy. Director General (P), 45, A-Wing, DGHS, Nirman Bhawan, New Delhi
12. Dr. N.K. Ganguly, Director General, ICMR, Ansari Nagar, New Delhi-110029
13. Dr. P.N. Sehgal, Ex. Director NICD, A-103, Swasth Vihar, Vikas Marg, Delhi-110092
14. Dr. J.P. Gupta, Ex. Director NIH FW, B-89, Swasth Vihar, Vikas Margm New Delhi-110092.
15. Dr. Chusak Prasittisuk, Addl. Advisor .WHO/SEARO, I.P. Estate, New Delhi-110002
16. Dr. S.Pattanayak, B-19, Swasth Vihar, Delhi-110092
17. Sh. C.P. Viyas, Asst. Controller of Programme, Director General Doordarsan ,PB, BCI Mandi House, New Delhi.
18. Dr. Alpana Sagar, Asstt. Professor , Centre of Social Medicine and Community Health, Jawahar Lal Nehru University, New Delhi
19. Dr. (Mrs.) Ira Ray, Addl DGHS, GOI, Nirman Bhawan, New Delhi-110 011
20. Dr. Shiv Lal, Addl. DGHS, GOI., Nirman Bhawan, New Delhi-110 011
21. Dr. Jotna Sokhey, Addl. Project Director, NACO, MOH & FW, Nirman Bhawan, Room No. 403, D-Wing, New Delhi-110011
22. PPS to DGHS, Nirman Bhawan, New Delhi-110011

Draft

Minutes of the meeting of National Task Force for Lymphatic Filariasis Elimination (LFE) held on 21st December 2001 at the Resource Centre (Room No. 445), Nirman Bhawan, New Delhi

A meeting of National Task Force for Lymphatic Filariasis Elimination (LFE) was held on 21st December 2001 at the Resource Centre (Room No. 445) , Nirman Bhawan, New Delhi. Dr. S. P. Aggarwal, DGHS, Govt. of India and Chairman of the National Task Force for LFE could not attend the meeting due to certain unavoidable circumstances and thus, Dr. (Mrs.) Ira Ray, Addl. DGHS, Govt. of India Chaired this meeting which was attended by twenty experts/members (Annexure-I).

While welcoming the participants, Dr. Ashok Kumar, Director, NAMP and Member Secretary highlighted the purpose of the meeting and following key agenda items, the details notes on which had already been sent to all members well in advance:

1. Renaming of Technical Advisory Group on Lymphatic Filariasis (LF) as National Task Force for Lymphatic Filariasis Elimination (LFE) under the Chairmanship of Director General of Health Services, Govt. of India.
2. Review of Pilot Project using annual single dose mass DEC administration (MDA) for Lymphatic Filariasis Elimination in 13 districts with effect from 1997.
3. Review of multicentric pilot study by ICMR (VCRC, Pondicherry) using annual single dose mass DEC + Albendazole administration for Lymphatic Filariasis Elimination in 9 districts w.e.f. Feb. – Mar. 2000.
4. Limiting DEC dosage schedule (s) for different age groups for MDA.
5. National Workshop on Social mobilization and community education strategy to achieve the objectives of MDA, May 2001– Recommendations.
6. Policy on Lymphatic Filariasis Elimination through MDA (DEC+Albendazole) in India.

After introduction of the agenda items, Dr. (Mrs.) Ira Ray requested the members to give their opinion / suggestion for the **Agenda Point No. 1** – ***Renaming of Technical Advisory Group on Lymphatic Filariasis as National Task Force for Lymphatic Filariasis Elimination.***

It was also proposed that some additional members having expertise in different fields of social sciences, mass communication, Economics, IMA etc. may be included in the National Task Force for LFE. Dr. Shiv Lal, Additional DGHS, GOI wanted to know if there would be changes in Terms of References (TORs) as well. Dr. Ashok Kumar replied that the TORs generally would remain same as most of the activities to be looked into are covered under the existing TORs of TAG. Dr. Jotna Sokhey, Additional Project Director, NACO, while agreeing to the renaming of Technical Advisory Group for Lymphatic Filariasis to National Task Force for LFE, mentioned that probably certain reconstitution of TORs is required as LFE involves social mobilization & community

Education and various logistic issues etc. Dr. K. K. Datta, Director NICD said that Health Economists, Scientists from related streams may also be included in the National Task Force. Dr. S. Pattanayak, Ex. Director, NMEP, mentioned that the Technical Advisory Group was meant for giving guidance on various issues related with National Filaria Control Programme (NFCP) while the National Task Force will specifically concentrate on Lymphatic Filariasis Elimination issues, so the renaming is justified. Dr. Chusak Prasittisuk, Regional Advisor, (VBC), WHO/SEARO, was of the same view and stated that the National Task Force would develop National Strategic plan for LFE and would focus on elimination rather than treatment only and serve two purposes.

Dr. (Mrs.) Ira Ray concluded that since the National Task Force is to advise, formulate, implement and monitor Lymphatic Filariasis Elimination, the renaming appeared to be justified although certain modifications in TORs are needed which might be incorporated.

Agenda Point No. 2

Review of Pilot Project using annual single dose mass DEC administration (MDA) for Lymphatic Filariasis Elimination in 13 districts with effect from 1997.

A presentation was made on the pilot studies being carried out by Dte. NAMP since 1997, involving annual single dose mass DEC administration (MDA) for LFE in 13 districts in 7 states. The results of population coverage and actual compliance during MDA rounds in 13 pilot districts and mid term assessment recommendations (January 2000) were also highlighted. It was proposed to the members to decide on issues viz. whether to continue or stop this project after 5 years duration as was envisaged in the beginning and get it evaluated or switch over all the 13 districts to mass co-administration of DEC+Albendazole.

Dr. K. K. Datta wanted to know if any evaluation of the study in all the states has been taken up or not. Dr. Jotna Sokhey stated that there is a large difference between the distribution and actual compliance, states should look into it so as to put more efforts in the implementation of their action plans . Dr. Lalit Kant, Sr. DDG, ICMR mentioned that a minimum percentage of coverage is to be there to have an impact on compliance. Dr. P. N. Sehgal, VHAI, was of the view that probably after proper evaluation, one could make out the reason of low coverages.

Dr. P. K. Das, Director VCRC made a small presentation on feasibility and operational aspects of the coverage & compliance with regard to annual single dose DEC mass administration which he said, is very difficult to achieve more than 70 % inspite of best efforts. He also presented data on impact of six rounds of chemoprophylaxis on mf prevalence. He mentioned that there is a threshold level beyond which the mf does not get lower, whatever additional inputs are there, especially where transmission is going on. So, there is a need for chemotherapy as well as vector control measures to be undertaken together. Dr. S. Pattanayak, Ex-Director, NMEP, said that mass DEC given over years in French Polynesia produced no remarkable reduction in mf rates. Hence, DEC alone can not sustain the programme, unless anti larval measures are also taken up simultaneously as demonstrated by CRME, Madurai in one of their studies. Therefore, the rationale for mass administration of DEC alone for coverage rate of 80% should be

debated further and the National Task Force should come to a conclusion soon. Dr. Alpana Sagar, Assistant Professor, CSMCH, JNU, said that due to complexity of several factors involved simultaneously, maximum of 70 to 75% coverage could only be achieved in the afore presented pilot studies using MDA. Dr. Shiv Lal added that there is a need to evaluate the issue of achievement of 80% coverage necessary for elimination of the disease.

Dr. Ashok Kumar mentioned that there should be an independent evaluation by ICMR through VCRC, Pondicherry. Dr. N. K. Ganguly, Director General, ICMR mentioned that this independent evaluation may be done by VCRC by involving any one of other centers like IRMS, NICD, Institute of Epidemiology and funds for the same may be provided by the Programme Directorate.

The Chairperson stated that VCRC, Pondicherry shall evaluate the MDA project on single dose mass DEC administration involving other institution as may be required & funds for this evaluation will be looked into by Dte. NAMP.

Agenda Point No. 3

Review of multicentric pilot study by ICMR (VCRC, Pondicherry) using annual single dose mass DEC + Albendazole administration for Lymphatic Filariasis Elimination in 9 districts w.e.f. 2000.

Dr. P. K. Das presented the details of the Multicentric Pilot Study by ICMR and elaborated the operational feasibility and impact of co-administration of albendazole+DEC in controlling LF. He presented that assessed coverage and consumption show a large range, as no incentives are given to the staff / persons involved in the exercise as well as due to poor infrastructure. Besides, improving coverage and compliance, sociological analysis is required. The need for a detailed study on the operational aspects and consumer compliance for both the types of intervention, i.e., DEC and DEC+ Albendazole in Tamil Nadu and Kerala was also emphasized by him. Dr. K. K. Datta desired to know the reason of low coverage, to which Dr. P. K. Das replied that during the second round of the project they are expecting better results, although it still may not achieve the desired level. Dr. (Mrs.) Ira Ray stated that for the other states, fresh strategies would be needed to evaluate such programmes. She also emphasized that the second round is therefore essential for proper evaluation. Dr. Chusak Prasittisuk, Regional Advisor (VBC), WHO/SEARO, stated that IEC, social mobilization, behaviour change are required so as to fill up big gap between coverage and compliance. Dr. N. K. Ganguly emphasised that these aspects should be taken up by the investigators and in the second round the results would be coming up clearly.

Dr. D. J. Augustin, Jt. DHS, Tamil Nadu stated that even if albendazole is not successful in eliminating worms, at least some benefit could be expected in the form of better child growth. Dr. Ashok Kumar pointed out that while agreeing to the mass administration of DEC+albendazole it has been given to understand that albendazole would also act as an add-on advantage for improving the compliance.

With regard to MOHFW / GOI decision for co-administration of DEC+albendazole to be taken up in all the four districts in Orissa, Dr. N. K. Ganguly stated that if in Orissa all 4 districts are to be covered with DEC+albendazole, then it would go out of the

ICMR study as at least one district with DEC alone is required for comparison purposes. The state Govt. is not willing to undertake MDA with DEC alone in any of the four districts. It was informed to the house that in the meeting of the ICMR Task Force on 20th December 2001, it has been decided that Dr. S. Pattnayak would go to Orissa to discuss this issue with the Orissa State Govt. authorities.

The Chairperson endorsed the decision of ICMR task force and opined that the matter may be taken up with the Orissa state Govt. so that all technical issues involved are well informed to the State authorities before all four districts are taken up for Co-administration of DEC + Albendazole.

Agenda Point No. 4

Limiting DEC dosage schedule (s) for different age groups for MDA.

A Presentation was made on the DEC dosage schedule for different age groups under NFCP used under MDA (DEC) and proposed reduced (3) DEC dosage schedule during future MDAs. Dr. Ashok Kumar mentioned that dividing into three dosage schedule (s), few would be getting more drug and few would be getting less drugs falling in 2-14 yrs age groups. Dr. S. Pattnayak also expressed that as DEC tablets are given according to the body weight and therefore, proposed dosage schedules require to be looked into very carefully. Dr. P. K. Das stated that VCRC is carrying out such study and results will be available in next 6 months or so.

The Chairperson suggested that we should wait till the results of VCRC study are available for taking further action on this issue.

Agenda Point No. 5

National Workshop on Social mobilization and community education strategy to achieve the objectives of MDA, May 2001 – Recommendations.

A presentation was made on the importance of social mobilization and community education strategies as essential components of LFE strategy to achieve desired drug compliance (above 80%) by community. Dr. Ashok Kumar added that concretization of manpower requirements with budgetary aspects for social mobilization is to be looked into immediately. He also stated the social mobilization package (COMBI) developed by Dr. Everold Hosein, Communication Expert from WHO/HQ needs to be pre-tested in the pilot study districts where MDA (DEC+Albendazole) is in operation - in the states of Orissa, Kerala and Tamil Nadu. He also referred to the point of funding (source) for undertaking social mobilization and community education efforts for successful MDA as and when expanded to other districts in various states of the country in future. He asked the National Task Force for LFE to provide guidance in this regard. Dr. N. K. Ganguly DG, ICMR and Dr. (Mrs.) Ira Ray, Addl. DGHS agreed fully with the opinion that that pre-testing of the model is a must. Dr. P. K. Das, then mentioned about the APW signed by the WHO for pre-testing this social mobilization & community education (SMCE) strategy during this year's mass co-administration of DEC+Albendazole with the Govt. of Orissa and Tamil Nadu and the amount of money to be spent on the same – 100,000 $ and 50,000$ respectively. Dr. P. N. Sehgal

suggested association of community level workers as well as local health officials in the pre-testing of the model.

Dr. Jotna Sokhey raised the issue of sustainability aspects of this programme, which according to her is also an equally important issue, which needs to be looked into. Dr. D. J. Augustin at this point mentioned that while the GOI is funding only 2 districts for DEC alone, WHO is providing funds for all 12 districts, so in view of funding constraints and benefiting the people, the state govt. has gone ahead with the agreement with WHO. Similarly, Dr. S. K. Kar, RMRC, Bhubaneswar, explained reasons for getting the WHO support for SMCE during mass co-administration of DEC+Albendazole. Dr. S. Pattnayak stated that the ICMR should be actively involved in social mobilization study or should at least monitor the same. Dr. Lalit Kant, Sr. DDG, ICMR, at this juncture suggested strongly that the Dte. of NAMP should make it clear to the states that the selected districts in the pilot study can not change their MDA on their own and they should comply with the original ICMR study plan. Mr. C. P. Vyas, Assistant Controller of Programme, Dte. General Doordharshan mentioned that the Doordarshan and AIR platforms could be used for effective social mobilization and community education.

It was decided by the Chairperson that ICMR should conduct a subsidiary meeting to discuss whether this SMCE strategy stands good or bad under the different geographical areas with different socio-economic status.

Agenda Point No. 6

Policy on Lymphatic Filariasis Elimination through MDA (DEC + Albendazole) in India.

It was unanimously decided that unless the ICMR study on annual single dose co-administration of DEC + Albendazole is over, no policy decision can be taken for further extension of MDA (DEC+Albendazole) in India.

Dr. (Mrs.) Ira Ray closed the meeting with vote of thanks.

Annexure - I

List of Members, Co-opted Members, Other Invitees who Attended the Meeting of National Task Force for Lymphatic Filariasis Elimination (LFE) on 21st December 2001, at Resource Centre, Nirman Bhawan, New Delhi – 110 011

Sr. No.	Name	Designation	Address
	DGHS		
1.	Dr. (Mrs.) Ira Ray	Additional DGHS, Govt. of India	Nirman Bhawan, New Delhi – 110011.
2.	Dr. Shiv Lal	Additional DGHS, Govt. of India	Nirman Bhawan, New Delhi - 110011
3.	Dr. Ashok Kumar	Director	National Anti Malaria Programme, (NAMP), 22, Shamnath Marg, Delhi – 110054.
4.	Dr. K. K. Datta	Director	National Institute Communicable Diseases, 22, Shamnath Marg, Delhi – – 110054.
5.	Dr. Jotna Sokhey	Additional Project Director	NACO, Ministry of Health & Family Welfare, Nirman Bhawan, New Delhi – 110054.
	ICMR		
6.	Dr. N. K. Ganguly	Director General	Indian Council of Medical Research, (ICMR) Ansari Nagar, New Delhi – 110029.
7.	Dr. Lalit Kant	Sr. Deputy Director General	-do-
8.	Dr. Rashmi Arora	Deputy Director General	-do-
9.	Dr. P. K. Das	Director	Vector Control Research Centre, Indra Nagar, Pondicherry – 605006.
10.	Dr. S. K. Kar	Director	Regional Medical Research Centre, (ICMR) Chandrasekharpur, Bhubaneswar – 751023
	STATE PROGRAMME OFICERS		
11.	Dr. D. J. Augustin	Joint Director of Public Health & PreventiveMedicine	DMK Complex, 259, Anna Salai, Chennai – 600006, Tami Nadu

13.	Dr.Ramesh Chandra	State Entomologist	DGHS, Swasthya Bhawan, Uttar Pradesh, Lucknow – 226002
14.	Dr. J. N. Pandit	Assistant Director of Health Services (Filaria)	Dte. of Health Services, 36, Nirmal Chandra Street, 3rd Floor, Calcutta – 700013.
15.	Dr. H. K. Das	Director of Health Services	Heads of Department Bui Bhubaneswar - 751023, Oris
16.	Dr. P. K. Siva Raman	Additional Director of Health Services	O/O DHS, Thiruvanthapuram, Kerala
	WHO		
17.	Dr. Chusak Prasittisuk	Regional Advisor	WHO/SEARO, I. P. Estate, New Delhi – 110002
	Others		
18.	Dr. S. Pattanayak	Ex. Director, NMEP	B – 19, Swasthya Vihar, Delhi – 110092
19.	Dr. P. N. Sehgal,	Ex – Director, NICD	National Institute Communicable Diseas Voluntary Health Association of India Saheed Jeet Singh Marg, Institutional New Delhi – 110067.
20	Sh. C. P. Vyas	Assistant Controller of Programme	Dte. General Doordharshan, PB, BCI, Mandi House, New Delhi.
21	Dr. Alpana Sagar,	Asstt. Professor , Centre of Social Medicine and Community Health,	Jawahar Lal Nehru University, New Delhi

*Dr. S. N. Sharma, Assistant Director, NAMP and Dr. (Ms.) Shampa Nag, Social Scientist, NAMP assisted in the meeting.

DIS-7B-30

FIFTIETH WORLD HEALTH ASSEMBLY WHA50.29
Agenda item 20 13 May 1997

Elimination of lymphatic filariasis as a public health problem

The Fiftieth World Health Assembly,

Deeply concerned at the widening spread and increased distribution of lymphatic filariasis throughout the world in both urban and rural areas and concerned that it affects all ages and both sexes;

Appreciating with grave concern the human suffering, social stigma and costs tosociety associated with lymphatic filariasis morbidity;

Recognizing that there is a general lack of awareness concerning this disease and its impact on health status, and that there are insufficient data on its prevalence and distribution;

Welcoming the recent studies which have defined new, simplified, highly effective strategies;

Acknowledging that an international task force on disease eradication has recently identified lymphatic filariasis as one of only six "potentially eradicable" infectious diseases,

1. URGES Member States:

(1) to take advantage of recent advances in the understanding of lymphatic filariasis and the new opportunities for its elimination by developing national plans leading to its elimination, as well as for the monitoring and evaluation of programme activities;

(2) to strengthen local programmes and their integration with the control of other diseases, particularly at the community level. in order to implement simple, affordable, acceptable and sustainable activities based on community-wide treatment strategies, but supplemented where feasible by vector control and improved sanitation;

(3) to strengthen training, research, diagnostic laboratory, disease and data management capabilities in order to improve clinical, epidemiological and operational activities directed toward eliminating lymphatic filariasis as a public health problem..

(4) to mobilize support of all relevant sectors, affected communities and nongovernmental organizations for the elimination of the disease.

2. INVITES other specialized agencies of the United Nations system, bilateral development agencies, nongovernmental organizations and other groups concerned to increase cooperation in the elimination of lymphatic filariasis through support of national and international programmes relevant to the prevention and elimination of lymphatic filariasis;

3. REQUESTS the Director-General:

(1) to bring to the attention of the other specialized agencies and organizations of the United Nations system, bilateral development agencies, nongovernmental organizations and other groups concerned the need for closer collaboration in the elimination of lymphatic filariasis as a public health problem;

(2) to mobilize support for global and national elimination activities;

(3) to keep the Executive Board and Health Assembly informed as necessary of progress in the implementation of this resolution.

Ninth plenary meeting, 13 May 1997

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TRANSACTIONS OF THE ROYAL SOCIETY OF TROPICAL MEDICINE AND HYGIENE (1996) 90, 669–670

Short Report

Impact of lymphatic filariasis on the productivity of male weavers in a south Indian village

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Keywords: filariasis, *Wuchereria bancrofti*, labour productivity, India

Assessment of the economic impact of infectious diseases is hampered by the lack of qualitative and quantitative information of the impact on productivity of affected individuals and communities. The few studies that have been undertaken were often poorly designed and, in many instances, provided contradictory results (EVANS, 1992). The infectious diseases which have received most attention in this area are malaria (AUDIBERT, 1986; SHEPARD, 1991), schistosomiasis (COLLINS *et al.*, 1976; BARBOSA & PEREIRA-DA-COSTA, 1982; AUDIBERT, 1986), guinea worm disease (BELCHER *et al.*, 1975; BRIEGER & GUYER, 1990), and leprosy (MAX & SHEPHERD, 1989). Despite the obvious debilitating effect of chronic lymphatic filariasis, there has been no quantitative study of its impact on economic output, until a recent multi-centre study funded by the World Health Organization (TDR).

The present study investigated the impact of chronic lymphatic filariasis, caused by *Wuchereria bancrofti*, on the productivity of male weavers in a rural community in Villupuram Ramasamy Padaiatchiar district of Tamil Nadu state in south India. A cohort of 39 male weavers with chronic filariasis (27 with hydrocele, 10 with lymphoedema and 2 with both), and a cohort of 39 without filariasis were recruited to this case–control study. The cases and controls were loosely matched by age (mean ages were 36·4 and 34·9 years respectively). The 78 weavers were visited daily for 184 consecutive days (6 months). The number of hours worked on the handloom and the length of cloth produced were recorded daily for each individual weaver. The weavers receive payment in accordance with the length of the cloth produced, not the number of hours or days worked. The prevailing wage rate was 12 rupees (US$ 0·33) per metre of cloth produced.

These data are unique. There was unlikely to have been preselection of healthy workers as observed in some of the studies of plantation workers and schistosomiasis (PRESCOTT, 1979), as individuals could decide whether or not to become weavers and were paid simply according to their output. Moreover, there were not the problems involved in trying to estimate the impact of other types of inputs, such as fertilizer and pesticides, on output as in the case of agriculture (AUDIBERT, 1986). Apart from the loom, labour input directly determined output and these data allowed the impact of the quantity of labour and the productivity per hour to be related directly to disease status for the first time.

The analysis demonstrated a linear relationship between the numbers of hours worked and the length of cloth produced over 6 months for both the case (R^2=0·97) and control (R^2=0·94) cohorts, with controls consistently producing more cloth than cases (see Figure). Matched analysis demonstrated that the median difference in number of hours worked was not significantly different from zero (sign test, P=0·75), but that

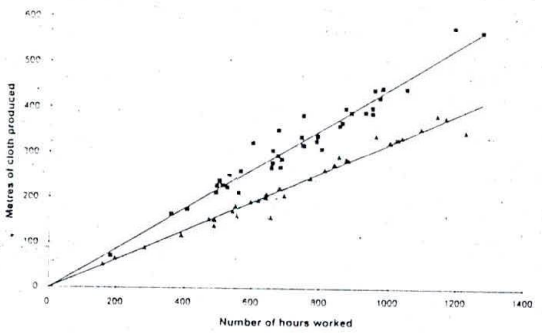

Figure. The relationship between metres of cloth produced and number of hours worked by weavers in the case (▲) and control (■) cohorts. The lines represent the best fit linear regression calculated by least squares for cases (y=0·318x, R^2=0·97) and controls (y=0·438x, R^2=0·94).

the median difference in productivity (metres of cloth produced per hour) was significantly different from zero (sign test, $P=0{\cdot}0001$). Therefore, although the cases and controls worked a similar number of hours, the productivity of the cases was significantly less than that of the controls; the productivity of cases was reduced by an average 27·4%, in comparison with the matched controls.

The results of the study clearly imply that lymphatic filariasis has an adverse impact on the productivity and wage-earning capacity of this particular occupational group. Many previous studies have assumed that illness simply reduces time, and in previous filariasis studies, for example, it was assumed that one day of acute attack was equivalent to one day of non-work. However, this study has shown that the impact of chronic disease is more complex, affecting output per hour rather than hours worked, and therefore more careful design of studies investigating economic impact is required. More detailed analysis is under way to investigate the influence of type and duration of chronic disease, occurrence of acute episodes, and socio-economic variables on the productivity functions.

Acknowledgements

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Announcement

International Conference on Emerging Zoonotic Infectious Diseases
Taipei, Taiwan (Republic of China)
1–4 March 1997

Further information can be obtained from Chuan Chin, Secretary General, Institute of Preventive Medicine, National Defence Medical Centre, P.O. Box 90048-700, Taipei, Taiwan, ROC; phone +886 2 672 1907, fax +886 2 673 1154.

RECORD OF THE

LYMPHATIC FILARIASIS GLOBAL ALLIANCE AD-HOC STRATEGIC PLANNING WORKSHOP

FOLLOW-UP OF THE SECOND GLOBAL ALLIANCE MEETING

Liverpool School of Tropical Medicine, United Kingdom

11-13 December 2002

CONTENTS

1. Purpose
2. Review of Global Programme
3. Regional Plans, Priorities and Funding Needs
4. Alliance Key Issues
5. Partner Contributions
6. Advocacy and Fundraising
7. Alliance Organizational Framework
8. Meeting Resolutions
9. Calendar Events

Attachments

A Workshop Attendees
B List of Presentations
C Global Alliance Framework

LYMPHATIC FILARIASIS GLOBAL ALLIANCE
AD-HOC STRATEGIC PLANNING WORKSHOP
11-13 DECEMBER 2002

1. PURPOSE

The meeting was an ad-hoc gathering of representatives of different Alliance partners to follow up the decisions taken at GAELF2. Specifically how the Global Alliance can assist the Global Programme to Eliminate Lymphatic Filariasis (PELF) to scale up rapidly to treat 350 million people by 2005. The major Terms of Reference for the meeting were to cover:

- Planning and costing for 2003-5 by regions and countries
- Resource mobilization to upscale the programme
- Alliance partner contributions
- Internal and external communications of the Alliance
- Arrangements for the next GAELF meeting

Additionally the meeting discussed the major strategic issues facing the programme, proposals from the Advocacy and Fundraising Task Force, and agreed working arrangements for the Alliance for the period up to the next GAELF meeting.

This record provides a summary of key information, agreements and actions. Copies of the presentations are available on request from the Liverpool Lymphatic Filariasis Support Centre (LFSC) – see Attachment B for list of presentations.

2. REVIEW OF THE GLOBAL PROGRAMME WHO

Dr N Zagaria presented a review of the global programme covering of progress achieved to date, lessons learned and detailed objectives for the short, medium and long term.

Progress:
- Number of people treated rising from 3m in 2000, 26m in 2001 to 82m in 2002
- Disability prevention strategy and training packages developed

Lessons learned:
- Importance of political commitment
- Key role of national level partnerships
- Social mobilization to achieve high coverage
- Task of defining and measuring progress indicators

Short Term Objectives (2003-5):
- Complete mapping in all countries with ongoing MDAs
- Scale up to 350 million people treated
- Scale up disability prevention interventions
- Develop technical support capacities in regions

Medium Term Objectives (2006-10):
- Initiate MDAs in all endemic Implementation Units (IU)
- Assess interruption of transmission in IU's with five rounds of MDA
- Large scale disability prevention interventions in all countries

Long Term Objectives (2011-20):

- Reduce infection levels in all IUs to interrupt transmission
- Surveillance in children
- All lymphodema patients access self care knowledge
- All hydrocele patients access to surgery

Strategic issues raised:

- Communications and coordination between the centre, regional PRG's and countries required to support country programmes.
- Strengthening the scientific and evidence base, and monitoring and evaluation.
- Enhancing political commitment and awareness, and acquiring funding required for a rapid scale up in Africa.
- Integration of LF elimination into health systems and other local health programmes.
- Research into a macro-filaricide.
- Redefinition and clarification of the goal? – interruption of transmission vs elimination as a public health problem.

3. REGIONAL PLANS, PRIORITIES AND FUNDING NEEDS Regions

Plans for up-scaling in 2003-5 were presented by each region as follows:

Africa	Drs P Kilima/J Gyapong/J.B. Roungou
Americas	Drs J Ehrenberg/G Gonzalvez
Eastern Mediterranean	Drs M El-Setouhy/R. Ben Ismail
Mekong Plus	Drs CP Ramachandran/EA Padmasiri/K. Ichimori
India Sub-continent	Drs M Ismail and EA Padmasiri
Pacific Islands	Drs K Ichimori and J Koroivueta

The meeting divided into two groups to allow the regions to develop the costs and funding requirements in a standard format. The figures presented are summarised below:

Country and Regional Costs and Funding Summary

Region	Number Treated 2003-5	Country Cost $ million	Regional Cost $ million	Funding Available $ million	Funding Gap $ million	Country Cost per person US Cents
Americas	10.8	10.15	0.97	2.76	8.36	94.0
India SC	469.5	24.76	0.83	5.1	20.49	5.3
Mekong +	192.7	4.77	0.46	0.45	4.78	2.5
PacELF	9.3	0.85	0.73	1.21	0.37	9.1
EMRO	18.1	5.22	0.83	1.58	4.47	28.8
Africa	169.2	65.63	6.93	16.41	56.15	38.8
TOTAL	**869.6**	**111.376**	**10.754**	**27.51**	**94.62**	**12.8**

The conclusion from this analysis was that the Global Programme has a funding gap of $95m for 2003-5. If this is extrapolated over the planned 20 year life of the programme this results in a total budget requirement of $893m. With estimated funds available of $253m this leaves a funding gap of $640m over the life of the programme.

The regional representatives were requested to review these figures and advise any changes.

4. ALLIANCE KEY ISSUES

The second group discussed key issues, which were summarised by Dr F Richards as follows:

Health and functioning of the Regional Programme Review Groups:

- Structures and financing
- Organizational models and model programmes
- Facilitating arrangements

Messages and advocacy:

- Operational definitions of success
- Milestones of scientific progress need to be established
- Visuals needed for communications and resource mobilization

Others:

- Treatment targets and scaling up
- Integration with primary healthcare
- Synergy with other disease programmes
- Roles of NGDOs
- Unstable populations, conflict zones, and cross border issues
- Customs clearance and taxation

Possible Alliance issues:

- National capacity building
- Responsibilities of RPRGs and National functions

Other points raised but not classified as Alliance issues:

- Operations research
- Incentives for distributors/precedents of other programmes
- Social mobilization
- Certification process
- Treatment in urban areas
- Adverse experiences
- Disability alleviation programme

5. PARTNER CONTRIBUTIONS

The various Alliance partners attending the meeting presented the scope of their contributions to the Global programme.

Dr E Ottesen presented a summary of the different roles played by partners as follows:

Donors	Enhancers	Implementers
GSK	WHO	Ministries of Health
Merck	Liverpool	NGDO's
Gates	Emory	Carter Center
DFID	MDP	
JICA		
Arab Fund		

This helps in clarifying that many Alliance partners act in more than one role, and the "Enhancers" in particular have dual roles of passing on donor funds or drugs to countries, as well as participating in support activities.

Each partner presented their contributions to the global programme. The table below summarises the presentations together with verbal answers to questions.

Summary of Partner Contributions for 2003-5

Partner	Cash	Internal Costs	Drugs	Support
GSK	$5.1m	$5.0m Staff etc	716m albendazole value $136m	Advocacy and fund raising, communications, academic support centres
Merck/MDP		$3.0m * MDP costs & shipping	467m * Mectizan® value $700m	Jointly fund MDP, research support, Country support (MDP)
Emory	$1.3m (Gates)	$2.2m (Gates, GSK)	-	Model programs, AME Economics & costs, US fundraising
Liverpool	$4.1m * (DFID, Gates)	$1.5m * (DFID, Gates, GSK)	-	Country support, capacity building, mapping, training materials, communications
NGDOs	n/a (Gates, Other)	na (Gates, Other)	-	Country support in many African programmes Disability alleviation
WHO	$5.3m (Gates, other)	$5.2m Regular & extra budget)	DEC procurement	Country support, health policy and technical guidelines, training material, operational support, advocacy, programme monitoring, secretariat to Alliance.

* Numbers submitted/revised post meeting.

6. ADVOCACY AND FUNDRAISING AND COMUNICATIONS

6.1 Advocacy and Fundraising

Dr B Bagnall and Ms P Wuichet presented the progress achieved since GAELF2. This was summarised in a paper tabled at the meeting (copies available from LFSC). The Task Force has focused on developing a framework for fund raising for use by Alliance partners as follows:

Bilaterals	lead by	WHO
US Private Sector	lead by	Emory
UK/Europe Private Sector	lead by	Liverpool
Other Regions	lead by	Regional groups

Proposals included:

- Creation of a global data base of donors and prospective donors
- Assisting regions in accessing training and materials and arranging donor meetings
- Providing a global framework for communications

- Encouraging country programmes to use the framework and advocacy materials to aid fund raising efforts within the countries.
- Promoting an Alliance identity (logo, slogan etc)
- Assisting the establishment of regional support centres for advocacy and fundraising

Dr Bagnall estimated that the Task Force would need two full time staff and a budget of $0.25m per year to undertake a professional fundraising effort.

There was an extensive discussion on issues including:

- How does LF compete with other health priorities such as HIV/AIDS?
- What are the key advocacy messages?
- Time-scale for raising funds and how do we handle them.
- Need for country training on financial management and fund raising.
- Need to involve the countries in the fund raising activities.
- Countries can raise funds existing basket funding by making LF a priority.
- Need advice on how to structure mechanisms for financial management
- Need an entity to make decisions on allocation of funds.
- How do we initiate programme synergies.

The meeting agreed that there was an urgency to continue the work and for the Task Force to prepare a plan.

6.2 Communications

Dr F Rio presented the progress on Alliance communications, the website and work to develop an Alliance logo and identity. A process has been followed to develop a list of criteria for a logo which has been given to three design agencies, each of which will produce 2 or 3 example logos for review. Dr Rio will send the logos and review criteria to Alliance partners in the next few weeks.

Action: WHO

It was agreed that the Alliance partners supported the work in developing an Alliance identity, and would participate in the review and adoption of a logo for use in Alliance materials.

Agreement

7. ALLIANCE ORGANIZATIONAL FRAMEWORK

Dr N Zagaria outlined the proposal contained in a paper circulated by WHO prior to the meeting (see Attachment C). This covered the history of the Alliance and the Programme, the role of WHO and the roles of the Secretariat and the Task Force for Advocacy and Fundraising. The paper describes the need for the Alliance to address the issues of: resource mobilization to support the scale up, arrangements for distribution of funds received, planning and organization of GAELF3, communications and development and expansion of the partnership.

The letter from Dr S Stansfield of the Gates Foundation was circulated and key points emphasised and discussed. In it the Gates Foundation recommends to be attractive to potential donors the Alliance should adopt a framework for the partnership which is low on overhead cost and bureaucracy and high on accountability and leadership.

The McKinsey report commissioned by the Gates Foundation on Public Health Alliances, was presented by Prof D Molyneux, and the implications for the LF Alliance were discussed.

There was a wide ranging discussion on options for how to organize the work of the Alliance and a resolution was agreed which is documented below.

8. RESOLUTIONS (as documented and agreed in the meeting)

8.1 Alliance Secretariat

The Secretariat of the Global Alliance be organized to include 5 members as follows:

- The Chair of the Alliance
- The Chair of the Task Force for Advocacy and Fundraising
- The Chair of the Task Force on Communications and GAELF3
- Two representatives from WHO (GPELF)

The Secretariat will be action oriented, strategic, and empowered to advance Alliance activities until the next meeting of the Global Alliance in 2004. The Secretariat will initially be based in WHO Geneva.

It was agreed that the Alliance will always be chaired by a representative from an endemic country. It was agreed unanimously that Dr J. Galvez Tan from the Philippines will be the Chair of the Alliance up to the GAELF meeting in March 2004.

The Secretariat will draft its Terms of Reference for review and adoption as follows:

- Draft Terms of Reference circulated to Alliance partners 15 Jan 03
- Review and finalize the Terms of Reference 1 Mar 03

The Terms of Reference will include:

- Support the GPELF in updating the Program Strategic Plan
- Develop and recommend alternative GA governance structures (including supporting financial mechanisms) for ratification during GAELF3

8.2 Task Force on Advocacy and Fundraising

The Task Force for Advocacy and Fundraising will be chaired by Dr B Bagnall and based in the US.

The Terms of Reference will be drafted by 15 Jan 03

Suggested ToR will include:
- Expand the donor base for the GPELF

8.3 Task Force for Communications and GAELF3 Meeting

The Task Force for Communications and GAELF3 will be chaired by Prof D Molyneux and be based in Liverpool.

A sub-group will be established for the GAELF3 meeting.

The Terms of Reference will be developed by 1 March 03.

8.4 GAELF3

Dr El Nasr from the Government of Egypt announced that the Global Alliance were invited to hold the next GAELF meeting in Egypt. This invitation was warmly received and it was agreed the next GAELF meeting will be held in March 2004 in Egypt. The meeting thanked the Government of Egypt for offering to host the meeting in Egypt.

A planning sub group will be organized. Suggestions for members to be sent electronically by 15 Jan 03.

The two Task Forces will draw inputs from the Regional PRG chairs.

9. CALENDAR EVENTS UP TO GAELF3

15 Jan 03	Draft Terms of Reference for Task Forces
29-30 Jan 03	Gates GGRC5 meeting, Washington
Feb 03	PacCARE meeting, Fiji
28 Feb 03	Government of Egypt confirm dates for GAELF meeting in Egypt
1 Mar 03	Final Terms of Reference for Task Forces
March 4-6/03	MEC/AC meeting in US
March 03	India SC RPRG meeting, Dhaka, Bangladesh
March 03	Mekong + meeting, Kuala Lumpur, Malaysia
March 25-28	TAG meeting, near Geneva
April 03	AFRO RPRG meeting, Ghana
Aug 03	PacELF Prog Mgrs and PacCARE meeting, Fiji
1 Sept 03	AMRO RPRG meeting, Maceio, Brazil
Oct 03	AFRO RPRG plus Program Managers meeting, Togo
Nov 03	EMRO RPRG Sudan
Dec 03	JAF meeting, tba
Dec 03	Centennial meeting of the American Society of Tropical Medicine, in Philadelphia. This is a good opportunity to advance the LF program to a large audience. A working group comprising Dr E. Ottesen, Dr M. El-Setouhy, Dr J. Gyapong, and Dr B. Bagnall was established to prepare for the meeting.
Mar 04	GAELF3 Meeting in Egypt
Mar 04	Meeting of RPRG Chairs after GAELF3 meeting in Egypt

ATTACHMENT A WORKSHOP ATTENDEES

Lymphatic Filariasis Global Alliance Ad-Hoc Strategic Planning Workshop
Follow-up of the 2nd Global Alliance meeting, 11-13th December 2002
Liverpool School of Tropical Medicine, United Kingdom

Chair

Dr. J.Z. Galvez Tan, (1) Professor, University of the Philippines, College of Medicine, Department of Family and Community Medicine, Pedro Gil Street, Malate, Manila, Philippines; (2) Health Futures Foundation Inc. 1086 Del Monte Avenue, Quezon City 1105, Philippines. Tel +632 374 3745; Fax +632 413 8669; Email jzgalveztan@hotmail.com; galveztan@pacific.net.ph

AFRO

Chair of PRG
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Country representatives
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Dr. D. Kyelem, LF Elimination Program Manager, Ministry of Health. 01 BP 2935, Ouagadougou 01, Burkina Faso. Tel. +226 308790; Fax +226 32 4662; Email dominiquekyelem@yahoo.fr

Regional Adviser
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AMERICAS

Chair of PRG and Country representative
Dr. G. Gonzalvez, Director General, Centro Nacional de Control de Enfermedades Tropicales (CENCET), Secretaria de Estado de Salud Publica y Asistencia Social, Av. Duarte No. 269, Villa Apdo. Postal 1303, Santo Domingo,Dominican Republic. Tel. + 809 536 9604 X228; Fax. +809 536 2281; Email malaria@centennialrd.net

Regional Adviser
Dr. J. Ehrenberg, Regional Adviser, HCT, PAHO, 525 23rd Street, Washington DC 20037, USA. Tel. +1 202 974 3894; Fax +1 202 974 3688; Email ehrenbej@paho.org

EMRO

Chair of PRG
Dr. M. El-Setouhy, Ain Shams University, College of Medicine, Department of Community Environmental and Occupational

	Medicine, Abbasia, Cairo 11516, Egypt. Tel. + 202 403 9761/+202 261 3624; Fax +202 683 9622/+202 483 7888; Email. setouhy@menanet.net **Country representative** Dr. Mahmoud Abou El Nasr, First Under-Secretary, Ministry of Health and Population, Cairo, Egypt. Tel. Fax. Email mabuelnasr@hotmail.com **Regional Adviser** Dr. R. Ben Ismail, CTD, WHO EMRO, Abdul Razzak al-Sanhouri Street, P.O. Box 7608, Nasr City, Cairo 11371, Egypt. Tel. +202 276 5280; Fax +202 276 5414; Email ismailr@emro.who.int
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MEKONG PLUS	***Chair of PRG*** Professor Dato Dr. C.P. Ramachandran , Faculty of Medicine and Health Sciences, Universiti Putra Malaysia, Selangor Darul Ehsan 43400 UPM Serdang, Malaysia. Tel. +603 269 87275; Fax. +603 269 86152; Email ramacp@hotmail.com ***Country representative*** Dr. L. Hernandez, National Filariasis Elimination Program Coordinator, Infectious Diseases Office, National Center for Disease, Prevention and Control, Department of Health, 3F, Bldg No.13, San Lazaro Compound, Sta. Cruz, Manila, Philippines. Tel/Fax +63 2 711 6808; Email dr_leda@edsamail.com.ph ***Regional Adviser (SEARO)*** Dr. E.A. Padmasiri, SEARO, World Health House, IP Estate, Ma Marg, New Delhi, India; Tel +91 11 233 70804; Fax +91 11 233 70197; Email Padmasiri@whosea.org
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Merck/MDP	Ms. B. Colatrella, Director,Worldwide Product Donation Policy & Programs,, Merck & Co.Inc. One Merck Drive, P.O. Box 100 W51A-35, Whitehouse Station, New Jersey 08889-0100, USA. Tel. +1 908 423 2047; Fax +1 908 423 1987; Email Brenda_Colatrella@merck.com Dr. B. Thylefors, Mectizan Donation Program,Task Force for Child Survival and Development, 750 Commerce Drive, Suite 400, Decatur, Atlanta 30030, USA. Tel +1 404 371 1460; Fax +1 404 371 1138; email bthylefors@taskforce.org
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	Dr. G. Biswas. Lymphatic Filariasis Elimination (CEE/FIL), Strategy Development and Monitoring for Eradication and Elimination (CPE/CEE), World Health Organization, 20 Avenue Appia, 1211 Geneva 27, Switzerland. Tel +41 22 791 3850 (M) +41 79 477 1736; Fax +41 22 791 4777; Email biswasg@who.int
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Observers and Advisers Advocacy and Fundraising	Dr. A. Haddix, Rollins School of Public Health, Emory University, 1518 Clifton road NE, Atlanta GA 30322, USA. Tel. +1 404 727 3558; Fax 1 404 727 5530; Email achaddi@sph.emory.edu
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	Ms. P. Wuichet Project Resource Group, P.O. Box 5743, Atlanta, GA31107, USA. Tel. +1 404 853 7888; Fax +1 404 876 9440; Email pwuichet@projectresourcegroup.com

ATTACHMENT B LIST OF PRESENTATIONS

Lymphatic Filariasis Global Alliance Ad-Hoc Strategic Planning Workshop
Follow-up of the 2nd Global Alliance meeting, 11-13th December 2002
Liverpool School of Tropical Medicine, United Kingdom

Day 1

AFRO
Introductory remarks. The general trend of disease burden. (Dr P Kilima)
Multinational Research. Dealing with Cultural Pluralism (Dr J Gyapong)

Americas
LF regional plan (Dr G Gonzalvez/Dr J Ehrenberg)

EMRO
Lymphatic Filariasis Elimination Program in EMRO (Dr M El-Setouhy)

Indian Subcontinent RPRG
Elimination of ELF in Indian Subcontinent (Prof M Ismail)
Update on country activities and strategic planning (2003-2007) – Bangladesh, India, Maldives, Nepal and Sri Lanka
Funding

Mekong-Plus (MK+ELF)
Countries of the Greater Mekong Sub-Region and Neighboring Countries (Prof Ismail /Dr Padmasiri)

Pacific Elimination of Lymphatic Filariasis
PacELF Approach (Dr J Koroivueta/Dr K Ichimori)

Day 2

Advocacy and Fundraising Group
Closing the Fundraising Gap (Dr B Bagnall/Ms P Wuichet)
www.filariasis.org, Consolidating information and communication (Dr F Rio)

Atlanta Group (Emory LF Support Center)
Identification of contributions to be made by partners and arrangements for coordination (Dr E Ottesen)

GlaxoSmithKline
Contribution to the Global programme to eliminate Lymphatic Filariasis (Dr B Bagnall)
Country/Regional costs and funding Global programme to eliminate Lymphatic Filariasis (Mr A Wright)

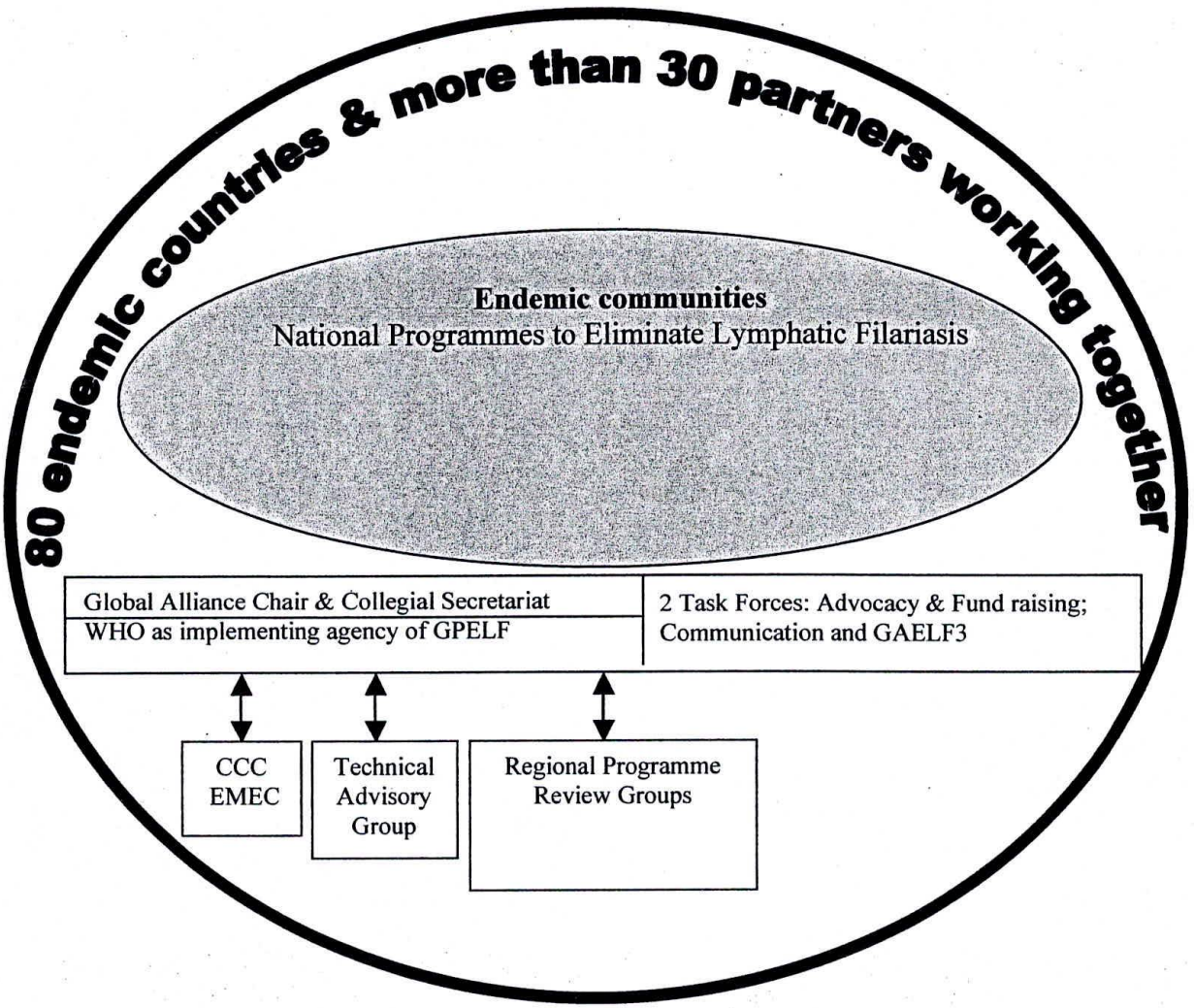
Liverpool LF Support Center
Why a support centre in the UK? (Prof D Molyneux/Mrs J Fahy)
Breakdown of the McKinsey Report (Prof D Molyneux)

NGDO (The Carter Centre)
Identification of contributions to be made by partners to the Global Programme ELF and arrangements for coordination. NGDOs (Dr F Richards)

World Health Organization
The framework of the Global Alliance to eliminate Lymphatic Filariasis (GAELF) (Dr N Zagaria)

ATTACHMENT C – GLOBAL ALLIANCE FRAMEWORK

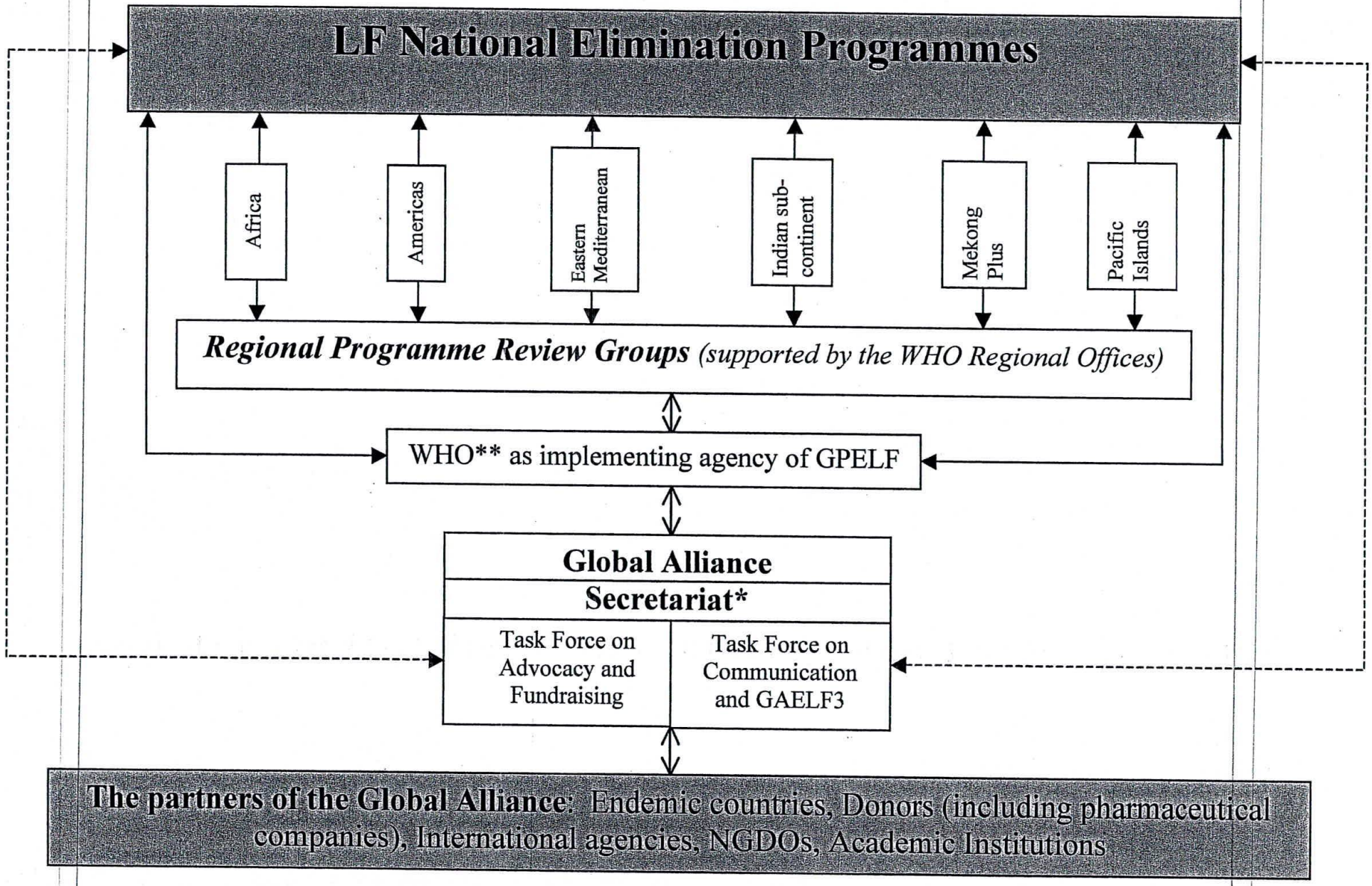
The framework of the Global Alliance to Eliminate Lymphatic Filariasis (GAELF)



Legend: Co-ordination/Communications/Technical Advice

CCC: GSK/WHO Collaboration Coordinating Committee
EMEC: Expanded Mectizan® Expert Committee

Global Programme to Eliminate Lymphatic Filariasis



* **Global Alliance Secretariat:** is a transitional body up to the next GAELF 3 (Cairo, March 2004), composed of:
The Chair of the Global Alliance, the two chairmen of the Task Forces, two members from WHO/Filariasis Team

** **WHO:** Country Offices, Regional Offices, HQ with LF Technical Advisory Group (TAG), GSK/WHO Collaboration Coordinating Committee (CCC), Mectizan® Expert Committee/Albendazole Coordination (MEC/AC)

Legend: ------ Dialogue/Information sharing
——— Coordination/support

Health and Global Public-Private Initiatives (Partnerships)

DRAFT 01

Elements for the case studies

Objectives

- Enhance CSOs' input and influence in the decision processes about GPPIs in countries where this initiatives are implemented
- Strengthen CSO's negotiation capacity to influence health policies and strategies aiming to the fulfilment of the right to health
- Create evidence on the performance of GPPIs at local level
- Generate evidence about the effects of GPPIs on local health systems

Concepts

- GPPI is

"A collaborative relationship which transcends national boundaries and brings together at least three parties, among them a corporation (and/or industry association) and an intergovernmental organization, so as to achieve a shared health-creating goal on the basis of a mutually agreed division of labour. (Buse and Walt 2000: 550)[1]

- *The right to health*

The Committee on Economical, Social and Cultural Rights in its Comment No. 14 of April-May 2000 declare that it "interprets the right to health, as defined in article 12.1 of the International CESCR, as an inclusive right extending not only to timely and appropriate health care but also to the underlying determinants of health, such as access to safe and potable water and adequate sanitation, an adequate supply of safe food, nutrition and housing, healthy occupational and environmental conditions, and access to health-related education and information, including on sexual and reproductive health". [2]

get original

- Key elements of the right to health

In the same document, the following elements are mentioned as essential

(a) *Availability*. Functioning public health and health-care facilities, goods and services, as well as programmes, have to be available in sufficient quantity within the State party. The precise nature of the facilities, goods and services will vary depending on numerous factors, including the State party's developmental level. They will include, however, the underlying determinants of health, such as safe and potable drinking water and adequate sanitation facilities, hospitals, clinics and other health-related buildings, trained medical and professional personnel receiving domestically competitive salaries, and essential drugs, as defined by the WHO Action Programme on Essential Drugs.

(b) *Accessibility*. Health facilities, goods and services have to be accessible to everyone without discrimination, within the jurisdiction of the State party. Accessibility has four overlapping dimensions:

Non-discrimination: health facilities, goods and services must be accessible to all, especially the most vulnerable or marginalized sections of the population, in law and in fact, without discrimination on any of the prohibited grounds.

Physical accessibility: health facilities, goods and services must be within safe physical reach for all sections of the population, especially vulnerable or marginalized groups, such as ethnic minorities and indigenous populations, women, children, adolescents, older persons, persons with disabilities and persons with HIV/AIDS. Accessibility also implies that medical services and underlying determinants of health, such as safe and potable water and adequate sanitation facilities, are within safe physical reach, including in rural areas. Accessibility further includes adequate access to buildings for persons with disabilities.

Economic accessibility (affordability): health facilities, goods and services must be affordable for all. Payment for health-care services, as well as services related to the underlying

determinants of health, has to be based on the principle of equity, ensuring that these services, whether privately or publicly provided, are affordable for all, including socially disadvantaged groups. Equity demands that poorer households should not be disproportionately burdened with health expenses as compared to richer households.

Information accessibility: accessibility includes the right to seek, receive and impart information and ideas concerning health issues. However, accessibility of information should not impair the right to have personal health data treated with confidentiality.

(c) *Acceptability.* All health facilities, goods and services must be respectful of medical ethics and culturally appropriate, i.e. respectful of the culture of individuals, minorities, peoples and communities, sensitive to gender and life-cycle requirements, as well as being designed to respect confidentiality and improve the health status of those concerned.

(d) *Quality.* As well as being culturally acceptable, health facilities, goods and services must also be scientifically and medically appropriate and of good quality. This requires, *inter alia*, skilled medical personnel, scientifically approved and unexpired drugs and hospital equipment, safe and potable water, and adequate sanitation. [3]

Other elements to be applied to assess the implementation of GPPIs

- Participation

A further important aspect is the participation of the population in all health-related decision-making at the community, national and international levels.[4]

- Sustainability

It is the capacity of the health system to function effectively over with minimum external input.[5]

- Transparency and Accountability

It refers to transparency in decision-making processes and mechanisms on financing, planning, implementation and monitoring of the activities of a GPPI in a certain country.

Accountability means that GPPI structures and mechanisms of implementation being required to account for decisions, policies and actions, usually to an individual or group but ultimately to the public.

- Effectiveness

Effectiveness means that the GPPI programmes achieve the goals and targets they have proposed in a certain country / geographical region or related to a certain target group

The cases of GPPIs

(1) - GAELF Global Alliance for the Elimination of Lymphatic Filariasis

Contact Address	**Person(s)**	Dr. Nevio Zagaria Global Alliance for the Elimination of Lymphatic Filariasis (GAELF) World Health Organization Lymphatic Filariasis Elimination 20 Avenue Appia, CPE L361 Geneva 27, 1211, Switzerland Tel: +41 22 791 2534 Fax: +41 22 791 4850 Email: zagarian@who.int; filariasis@who.ch http://www.filariasis.org
Mission / Objective		The primary objective of the Alliance is to eliminate lymphatic filariasis (LF) as a

public health problem by the year 2020. The strategy has two components: 1) to stop the transmission in all countries; and 2) to alleviate and prevent the suffering of over 20 million affected individuals. Additional aims of the Alliance are to support ongoing de-worming programs, provide an overall strengthening of the health services in endemic countries, enhance efficiency of drug distribution systems, and promote economic benefits to individuals and the community.

biomedical approach
could integrated vector control, IPM, health sys. strengthening dis. surveillance

The efforts of GAELF have been aided, in part, by two generous drug donations. In 1998, SmithKline Beecham, now GlaxoSmithKline (GSK), agreed to donate its drug albendazole free-of-charge until the disease is eliminated. This is likely to be a donation of between 4-6 billion tablets over a 20-year period. Merck & Co., Inc. also pledged to expand its Mectizan Donation Program for Onchocerciasis in all areas of Africa where the two diseases co-exist. In February 2001 the Bill & Melinda Gates Foundation gave $20 million to accelerate the elimination of Lymphatic Filariasis (LF) during the first five years of the 20-year global program.

Disease / Condition Lymphatic Filariasis (LF)

Product / Service Albendazole; Diethylcarbamazine (DEC); Mectizan

Legal status No separate legal status – a WHO-initiated alliance.

Established Formed in 1997; new agreement signed 2 December 1999

Major Participants

Public sector World Health Organization (WHO), World Bank, UNICEF, Spain, Government of, Belgium, Government of, Italy, Government of, Japan, Government of, Kuwait, Government of, UK Department for International Development (DFID), US Centers for Disease Control & Prevention (CDC), Netherlands Ministry for Development Cooperation. Ministries of Health.

Non-profit sector Liverpool School of Tropical Medicine. other international NGOs and academic institutions.

Commercial sector GlaxoSmithKline , Merck & Co., Inc.. Binax, Inc., U.S.

Major funders GlaxoSmithKline , Merck & Co., Inc.

Governance WHO controlled

(2) - GPEI Global Polio Eradication Initiative

Contact Person(s) Mr. Olivier Rosenbauer, Communication Officer

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World Health Organization
20 Avenue Appia
Geneva 27, 1211, Switzerland
Tel: +41 22 791 3832
Fax: +41 22 791 4193
Email: rosenbauero@who.int
http://www.polioeradication.org

Mission / Objective

- To interrupt transmission of the wild poliovirus globally and certify all WHO regions polio-free by the end of 2005.
- To conduct effective and high quality supplementary immunization activities, including national immunisation days and mop-up campaigns to interrupt wild poliovirus transmission.
- To develop and sustain certification standard surveillance and laboratory systems that can rapidly identify polio-infected areas.
- To ensure laboratory containment of wild poliovirus stocks.
- To develop a consensus strategy to stop polio immunisation after certification of eradication.
- To use polio eradication to strengthen and expand routine immunisation services.

Disease / Condition	Polio
Product / Service	Technical and financial support for all polio eradication activities, including supplementary immunization activities (ie. National Immunization Days), and acute flaccid paralysis surveillance including a global laboratory network. Support for routine immunization services, along with Vitamin A supplementation during polio National Immunization Days.
Legal status	No separate legal status. WHO programme.
Established	1988
Major Participants Public sector	World Health Organization (WHO), World Bank, UNICEF, Danish Agency for Development Assistance (DANIDA), Belgium, Government of, Italy, Government of, Japan, Government of, US Agency for International Development (USAID), UK Department for International Development (DFID), US Centers for Disease Control & Prevention (CDC), Canadian International Development Agency (CIDA), Netherlands Ministry for Development Cooperation. Ministries of Health of all recently or currently polio endemic countries, including India, Pakistan, Afghanistan, Nigeria, Niger and Egypt.
Non-profit sector	Bill & Melinda Gates Foundation, Australian International Health Institute. Rotary International, De Beers, governments of Finland and Germany, Rotary Foundation and the United Nations Foundation.
Commercial sector	Aventis SA. Wyeth and De Beers.
Major funders	US Agency for International Development (USAID), Japan, Government of, Bill & Melinda Gates Foundation, Canadian International Development Agency (CIDA), US, Government of, Netherlands, Government of, UK Department for International Development (DFID). Rotary International, the United Nations Foundation.
Governance	A programme spearheaded by WHO, Rotary International, the US Centers for Disease Control and Prevention and UNICEF. WHO provides the overall technical direction and strategic planning for the management and coordination of the initiative.

(3) - AAI Accelerating Access Initiative to HIV Care

Contact Person(s)	Dr. Joseph Perriens, Manager, Strategy Development for Responses Accelerating Access Initiative to HIV Care (AAI)
Address	The Joint United Nations Programme on HIV/AIDS (UNAIDS) 20 Avenue Appia Geneva 27, CH-1211, Switzerland Tel: +41 22 791 4456 Fax: +41 22 791 4898 Email: perriensj@unaids.org http://www.unaids.org/acc%5Faccess/index.html
Mission / Objective	To promote and support the implementation of the comprehensive care agenda, including treatments for opportunistic infections and antiretroviral therapy, in the hardest hit regions of the world. To support countries in developing national actions plans for improving access to HIV care, including outlining possible suppliers of HIV-related treatments and other commodities; facilitating negotiation with suppliers as requested, and promoting "tiered" pricing of medicines by all suppliers from the R&D and generics pharmaceutical industries.
Disease / Condition	HIV/AIDS
Product / Service	Coordinating action and facilitating negotiations with a range of suppliers.

Legal status	No separate legal status. Part of the existing remit of UNAIDS to promote the expanded response to HIV/AIDS.
Established	2000 May
Major Participants **Public sector**	UNAIDS, World Health Organization (WHO), World Bank, UNICEF, UN Population Fund (UNFPA).
Non-profit sector	n.a.
Commercial sector	GlaxoSmithKline , Merck & Co., Inc., Boehringer Ingelheim, Bristol-Myers Squibb Company, Roche Holding AG. In addition 34 additional suppliers of HIV related medications have expressed interest in supplying the countries. These are being evaluated.
Major funders	At country-level, the individual countries and patient payment.
Governance	The UNAIDS Secretariat is coordinating the endeavour.

(4) - Roll Back Malaria

Contact Address	**Person(s)**	Mr. David Alnwick, Director of Malaria Control Partnership Department (RBM) Roll Back Malaria Global Partnership Organization World Health Avenue Appia 20 27, 1211, Switzerland Geneva 22 791 2394 Tel: +41 alnwickd@who.int Email: http://www.rbm.who.int/
		Dr. Fatoumata Nafo-Traore, Executive Secretary (RBM) Roll Back Malaria Global Partnership Organization World Health Avenue Appia 20 27, 1211, Switzerland Geneva 22 791 2635 Tel: +41 Email: nafotraoref@who.int
Mission / Objective		Roll Back Malaria (which now consists of two entities) remains a global movement to halve the burden of malaria by 2010 with a focus on Africa. Its priorities are: - To increase global political commitment to tackle malaria more effectively through coordinated action; - To assist the health sector to focus resources on high disease burdens such as malaria and cost-effective intervention packages; - To increase the commitment, among the research community and private and sector; - To discover new products and cost effective control tools.
Disease / Condition		Malaria
Product / Service		Global leadership, strategy, global partnership secretariat as coordinating mechanisms, new tools for malaria control.
Legal status		No separate legal status. Partnership Secretariat is housed within WHO as a cabinet level project.
Established		1998 October

Major Participants **Public sector**	World Health Organization (WHO), World Bank, UNICEF, US Agency for International Development (USAID), United Nations Development Program (UNDP). , (Founding partners). Governments and ministries of endemic countries and bilateral aid organizations (Core partners).
Non-profit sector	Nongovernmental organizations, research and academic institutions.
Commercial sector	Members of the international oil and gas producers such as ExxonMobil and Eni, multinational pharmaceutical corporations such as Novartis SA., and GlaxoSmithKline; companies that manufacture and /or distribute insecticides for vector control such as Bayer and Syngenta; other industries operating in malaria-endemic countries.
Major funders	World Bank, US Agency for International Development (USAID), UNICEF, European Commission, World Health Organization (WHO), Bill & Melinda Gates Foundation, UK Department for International Development (DFID). The governments of Italy, Germany, Netherlands, Luxemburg, Norway and Japan.
Governance	Executive Secretary of RBM Partnership Secretariat is accountable to the RBM Partnership Board, and reports to the Executive Director of Communicable Diseases within WHO, as does the Director of the Malaria Control Department. Biannual global forum meetings are held for global partners to review progress of RBM.

(5) - GAVI. Global Alliance for Vaccines and Immunization and VF Vaccine Fund

Contact Person(s) **Address**	Ms. Lisa Jacobs, Communications Officer Global Alliance for Vaccines and Immunization (GAVI) UNICEF Palais des Nations Geneva 10, 1211, Switzerland Tel: +41 22 909 5042 Email: ljacobs@unicef.org http://www.VaccineAlliance.org
Mission / Objective	To fulfill its mission of protecting children of all nations and of all socioeconomic levels against vaccine-preventable diseases, GAVI has established six strategic objectives: 1. Improve access to sustainable immunization services. 2. Expand the use of all existing, safe and cost-effective vaccines where they address a public health problem. 3. Support the national and international accelerated disease control targets for vaccine-preventable diseases. 4. Accelerate the development and introduction of new vaccines and technologies. 5. Accelerate R&D efforts for vaccines needed primarily in developing countries. 6. Make immunization coverage a centerpiece in international development efforts.
Disease / Condition	Vaccine-preventable diseases of the poor
Product / Service	Vaccines
Legal status	No separate legal status. Secretariat housed at UNICEF Regional Office for Europe.

Health system develop should be the centre-piece

Established 1999

Major Participants

Public sector World Health Organization (WHO), World Bank, UNICEF, US Centers for Disease Control & Prevention (CDC). Developing country governments and international development agencies.

Non-profit sector Bill & Melinda Gates Foundation. Children's Vaccine Program at PATH, UN Foundation and Pasteur Institute.

Commercial sector Representation from the industrialized and developing country vaccine industry.

Major funders US Agency for International Development (USAID), Bill & Melinda Gates Foundation, Canadian International Development Agency (CIDA), Netherlands, Government of, UK Department for International Development (DFID). The above are funders to GAVI's financial arm, the Vaccine Fund.

Governance The GAVI Board includes five renewable members – WHO, UNICEF, The World Bank, and the Bill & Melinda Gates Foundation and eleven additional, rotating members responsible for representing the collective expertise and perspective of their constituencies: governments – developing countries (three) and industrialized countries (three), nongovernmental organizations, the vaccine industry – industrialized country and developing country, research institutes, and technical health institutes. The Working Group and Task Forces are comprised of members from the GAVI partner institutions.

Contact Person(s)

Mr. Jacques-François Martin, President (VF)
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Ms. Nancy Ives, Vice President of Communications (VF)
Vaccine Fund
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Email: nives@vaccinefund.org

Address

Mission / Objective The Vaccine Fund's mission is to mobilize resources for, champion, monitor the results of, and help sustain the Global Alliance of Vaccines and Immunization's program to protect the children of the world's poorest countries from vaccine preventable diseases.

The Vaccine Fund's strategic objectives: mobilize resources to achieve immunization sufficiency and sustainability; achieve recognition of and support for The Vaccine Fund's mission so as to maximize the value of its brand; manage The Vaccine Fund for efficiency and accountability for results; and ensure with GAVI partners a secure supply of all relevant vaccines are accessible to all target countries.

Disease / Condition Vaccine-preventable diseases of the poor

Product / Service Financial assistance, grant making, fund disbursement, fund management.

Legal status A 501(c)(3) charitable foundation under US law (contributions are tax-exempt for U.S. citizens and corporations).

Established 1999 October 26.

Major Participants

Public sector Bilateral donor governments, recipient country governments and UN agencies.

Non-profit sector Rockefeller Foundation, Bill & Melinda Gates Foundation.

Commercial sector Pharmaceutical industry representatives.

Major funders US Agency for International Development (USAID), Ireland, Government of, Danish Agency for Development Assistance (DANIDA), Bill & Melinda Gates Foundation, Canadian International Development Agency (CIDA), Netherlands, Government of, UK Department for International Development (DFID). As well as the governments of Norway and Sweeden and seeking additional governments and private donors.

Governance The Vaccine Fund is governed by an independent Board of Directors with responsibility for the disbursement of all funds. The Vaccine Fund Board makes decisions to allocate resources to recipient countries based on the recommendations of the GAVI Board.

(6) - IPAAA International Partnership Against Aids in Africa

Contact Person(s) Dr. Meskerem Grunitzky-Bekele
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Dr. Michel de Groulard
Int'l. Partnership Against Aids in Africa (IPAAA)
World Health Organization
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Mission / Objective
- A coalition under the leadership of African countries to reduce the number of new HIV infections in Africa, promote care for those who are infected with the virus and mobilise society to stop the advance of AIDS.
- To address social, economic and cultural inequalities as well as injustices which are the root causes of the epidemic; and not just health issues.
- To contribute to global efforts to curtail the spread of HIV in Africa and reduce its impact on human, social and economic development.
- To increase the resources available to national governments and communities to mount an adequate response to the AIDS epidemic.
- To ensure that countries are linked to sub-regional, regional and international resources and initiatives in order to benefit from other international and regional investments in addressing the epidemic.
- To step up prevention programmes.

Disease / Condition HIV/AIDS

Product / Service To expand AIDS activities so as to make an impact on the epidemic, through governments committing their political prestige and financial resources, involving civil society fully, emphasizing prevention and care, and supporting activities in a range of sectors, so as to limit the spread of the epidemic and mitigate the impact, and attract international support.

Legal status No separate legal status. Secretariat within UNAIDS.

Established	1999
Major Participants **Public sector**	UNAIDS, World Health Organization (WHO), UN Population Fund (UNFPA), Food & Agriculture Organization (FAO). ILO, UNHCR, WFP, UNDP, UNDCP, UNESCO, governments of African countries and bilateral organisations for technical cooperation and development.
Non-profit sector	NGOs, CBOs, Networks of people living with HIV/AIDS.
Commercial sector	Other private companies.
Major funders	World Bank, US Agency for International Development (USAID), Japan, Government of, Ireland, Government of, European Commission, Bill & Melinda Gates Foundation, Canadian International Development Agency (CIDA), Netherlands, Government of, UK Department for International Development (DFID), France, Government of, Belgium, Government of. Italy, government of, Sweden, government of, Norway, government of, Finland, government of, Germany, government of and United Nations Foundation.
Governance	Annual International Partnership Against AIDS in Africa Stakeholder meeting at an international level with representatives from all partnership constituents. Secretariat functions performed by UNAIDS.

Information needed

- The health situation in the area where the case study will take place
  - Main health problems
    - Described in terms of magnitude, distribution by social economic groups (specially disadvantaged groups), women/men, ethnic groups
    - Correlation with national situation
    - Major determinants of the health problems in the area

- The health system in the area
  - What is the health system doing in the area?
    - Related to the main health problems?
    - Major programmes and activities carried out in the area
    - Analysis of relevance of those programmes/activities
  - Strengths of the health system in the area
  - Weaknesses of the health system in the area

- The right to health at national / local level
  - According to the national constitution
  - Ratification and signature of international agreements and conventions (convenants)
  - Clarity about who (institution) is responsible for what, related to key elements of the right to health
  - Existence and functioning of mechanisms and specific places (offices) to get information, notify and make denounces about the right to health
  - Is people informed about contents, mechanism and procedures about the right to health

- The selected GPPI

A. About the health condition concerned to the GPPI

- The health problem concerned to the GPPI
  - Magnitude
  - distribution by social economic groups (specially disadvantaged groups), women/men, ethnic groups
  - Correlation with national situation
  - Major determinants of the health problems in the area

- The health system in the area in relation with the health problem concerned to the selected GPPI
  - What is the health system doing in the area?
  - Major programmes and activities carried out in the area
  - Analysis of relevance of those programmes/activities
- Strengths of the health system in the area
- Weaknesses of the health system in the area

B. About the process of implementation in the country

- Formulation of national plan
  - The process of negotiation of the programme contents for the country
  - Process and responsible institutions
  - Procedures
  - Participation of the target group, local authorities, local organizations, etc.

  ** Assessment in relation to elements of the right to health and elements for the assessment of the right to health (see above)

- The implementation
  - Human resources
  - Physical resources
  - Management aspects (planning, monitoring, reporting, etc)
  - Technical aspects
  - Administrative aspects

  ** Assessment in relation to elements of the right to health and elements for the assessment of the right to health (see above)

- The effects of the GPPI on the local health system
  - Positive effects (see elements of implementation)
  - Non-anticipated harmful effects

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[1] Buse, K. and G. Walt (2000). "Global public-private partnerships for health: part I – a new development in health?" *Bulletin of the World Health Organization/The International Journal of Public Health* 78, pp. 549-61.

[2] OUNHCHR, 2000. E/C. 12/2000/4, CESCR. General Comment 14

[3] OUNHCHR, 2000. idem

[4] OUNHCHR, 2000. idem

[5] La Fond, A. (1995). Sustaining Primary Health Care. Earthscan. London, pp 17

[6] http://www.ippph.org/ consulted 13.03.2003

[7] http://www.ippph.org/ consulted 13.03.2003

[8] http://www.ippph.org/ consulted 13.03.2003

[9] http://www.ippph.org/ consulted 13.03.2003

[10] http://www.ippph.org/ consulted 13.03.2003

[11] http://www.ippph.org/ consulted 13.03.2003

[12] http://www.ippph.org/ consulted 14.03.2003

Website: Eliminating Lymphatic Filariasis

The Lymphatic Filariasis website, "Eliminating Lymphatic Filariasis", (http://www.filariasis.org) presents material generally at a higher scientific level than what is usually found on the Web. It is comprised of two parts: public and private.

The **public site** has five components:

- *Elimination Programme:* presenting a thorough background and overview of the Collaborative Global Programme to Eliminate Lymphatic Filariasis; this section will be particularly useful for individuals seeking an overall understanding of the Programme.

- *Disease:* detailing basic information about lymphatic filarial infection and disease; appropriate for lectures to medical students or to update scientific knowledge of health personnel.

- *News and Documents:* containing: i) a page on which websites of related interest are grouped and accessible; ii) a page from which relevant documents in PDF format (a format that can be viewed and printed by most computer programmes) can be downloaded; iii) a calendar of upcoming events.

- *Partnership:* will contain information on the various partners involved in, or supporting, the programme

- *Research and Development:* will contain relevant information and be directly linked to the website of the WHO Communicable Disease Research and Development Programme (CRD).

To access the various pages of the website under each component click the hyperlink (the underlined word) on the left part of any page.

The **private site**, the Intranet, can be accessed by clicking the hyperlink "Intranet" on the left part of each page. It is a working tool for the various actors involved in efforts to eliminate lymphatic filariasis. To enter the Intranet the user is required to log in and type a password. Permission to use it is given by the "Eliminating Lymphatic Filariasis (ELF)" website administrator. This is to ensure confidentiality in the case of documents that are still in draft format or have restricted distribution. The Intranet is divided into the following sections:

- Stakeholders
- Programme Review Group (PRG)
- Collaboration Coordinating Commit.
- Mectizan® Expert Committee
- Programme Managers
- Projects
- Documents
- Communications
- Economics
- WHO Regional Offices
- Collaborating Centres
- Who's Who
- Website Administration
- View Comments

The sections *Documents* and *Who's Who* are open to everybody who has access to the Intranet. The sections *Stakeholders, PRG, CCC, Mectizan® Expert Committee, Programme Managers, Projects, Communications, Economics, WHO Regional Offices* and *Collaborating Centres* are accessible to individuals who are members of working groups or committees. The sections *Website Administration* and *View Comments* are only available to the Eliminating Lymphatic Filariasis website administrator in WHO.

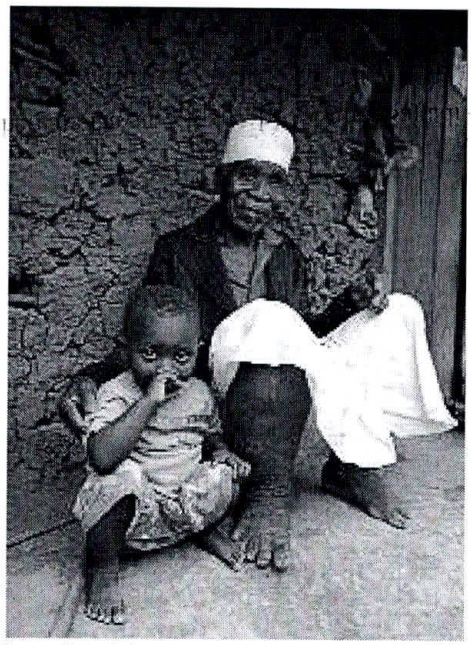
The sections *PRG, CCC,* and *Communications* contain subsections called '*Minutes*', *'Documents', 'Leave Comments on Documents', 'Leave a message on the Bulletin Board',* and '*e-mail everyone*'. The sections *Stakeholders, Mectizan® Expert Committee, Programme Managers, Projects, Economics, WHO Regional Offices* and *Collaborating Centres* contain all these subsections except '*Minutes*'. These subsections enable the members of working groups and committees to read the Minutes of their meetings, access, read and print relevant documents, as well as to leave comments on those documents. The subscribers of the above-mentioned sections can also leave messages on a bulletin board and send e-mail to everyone in that particular section.

for all leprosy patients in the world. The **Novartis Foundation for Sustainable Development** continues to support country-level efforts to change the image of leprosy, encouraging people to seek timely treatment as well as bringing leprosy services closer to patients. The foundation, founded 25 years ago, also supports and fosters programs in health and social development in developing countries.

For example, the foundation's Comprehensive Leprosy Care Project (CLCP) in India pioneered the provision of field-based disability care services. CLCP trains health care workers to better recognize and manage disabilities; patients, too, are trained to care for themselves. Introduced first in Gujàrat state in 1989, CLCP now also operates in Goa. In Sri Lanka, CLCP supports government efforts to integrate leprosy care into the general health care services. Seven thousand doctors and 1,500 pharmacists have been trained, and MDT, patient files and leprosy information are now available at all 1,000 health services. In Brazil the foundation is supporting local efforts to train health care workers and traditional healers and to establish a free phone information service for patients.
http://www.who.int/lep/

LYMPHATIC FILARIASIS (ELEPHANTIASIS)

Parasitic disease of the lymphatic system, often called elephantiasis. The disease is found in Africa, Asia and South America where 120 million people are infected and 1 billion are at risk.



Courtesy of Merck & Co., Inc.

Global Alliance to Eliminate Lymphatic Filariasis (GAELF)

The Global Alliance to Eliminate Lymphatic Filariasis was created with the aim to eliminate one of the world's leading causes of disability and disfigurement, as a public health problem by the year 2020. Initiated by the World Health Organization and **GlaxoSmithKline**, the work has evolved into a global alliance between international organizations in the public and private sectors, academia and non-governmental organizations working in partnership with ministries of health in tropical countries where lymphatic filariasis is endemic. Over the next 20 years **GSK** expects to donate up to 6 billion preventative albendazole treatments to any of the 80 endemic countries that are accepted into the program by the WHO. One of the other medicines needed to prevent lymphatic filariasis is **Merck**'s drug, Mectizan. In 1998, **Merck & Co., Inc.** widened the scope of its Mectizan Donation Program to include LF in African countries where river blindness and LF co-exist. **GSK** has also already provided grants to support partners through coalition building, workshops and communications. A study published in January 2003 reports that nearly 80 million people have been treated in over 34 countries in the African, American, Eastern Mediterranean, Mekong, Indian Sub-continent and Pacific regions.
http://www.filariasis.org/index.pl

13.30 – 14.30:	Lunch
15th January 2004 14.30 – 16.30 **Parallel Workshop 8** **Coordinators:** Mira Shiva/ WGNRR	**Key Issues in Women's Health** Manisha Gupte **Chair:** **Moderator: ? Jaya Velankar (India)** **1) Testimonies** a) Mary Sandasi (Zimbabwe) b) Elvire Beleoken (Cameroon) **2) Panelists** a) Women's Access to Health Care – Nadia (Netherlands) b) Reproductive Technologies: Mayhem on women's bodies– Sarojini(India) c) Right to Abortion* – (??) d) Sex Selective Abortion* – ?Kalpana (India) ?Sabu George (India) e) Trafficking, migration & labour rights – Rina Sengupta(Bangladesh) **3) Interactions from the floor**
15th January 2004 14.30 – 16.30 **Parallel Workshop 9** **Coordinators:** Vandana/	**Voices of the Unheard.. Children, adolescents and people with disability** **Chair : Pam Zinkin (UK)** **Moderator:** **1) Testimonies** a) Children's dreams through paintings – Arturo (Ecuador) b) Children's testimonies by Radio – Child to child (Ecuador) c) Mama Huaca Video – Dibujos Animados (Latin America) d) A street child's perspective* (India) **2) Panelists:** a) Disability and Health - Enrico Pupulin (Italy) b) Child health – The key issues – Vandana Prasad (India) c) Adolescent Health – Usha Nayar* (India) **3) Interactions from the floor**
15th January 2004 14.30 – 16.30 **Parallel Workshop 10** **Coordinators:** Thelma Narayan	**HIV/AIDS and the Resurgence of Communicable Diseases** **Chair :** **Moderator:** **1) Testimonies:** a) Jennifer Atieno (Kenya) b) Parinchay Health worker*, FRCH (India) c) Perspectives of PLWA,CHIN (India) **2) Panelists:** a) HIV/AIDS: Confronting the Crisis - WHO Team b) Lawyers Collective, HIV / AIDS Unit c) CHIN network (India) **3) Interactions from the floor particularly focused on WHO proposed initiatives**
15th January 2004 14.30 – 16.30 **Parallel Workshop 11** **Coordinators:** Abhay Shukla,	**Globalisation, Poverty, Hunger and Health** **Chair: Thomas Kocherry, World Forum of Fisherpeople, (India)** **Moderator: Abhay Shukla (PHM India)** **1) Testimonies:** a) Poverty in Germany: Gopal Dabade, BUKO b) Tackling malnutrition, Shanti / Kalpana, Arogya Iyakkam, Tamil Nadu (India) **2) Panelists:** a) Veena Shatrugna (India) b) Sheila Zurbrigg* (Canada) c) P. Sainath (India) d) Eugenio Villar (Peru) e) PRSP and Health – Atiur Rehman / Jobair Hassan (Bangladesh) **3) Interactions from the floor**

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Annex 1

DISCUSSION DOCUMENT

GLOBAL ALLIANCE TO ELIMINATE LYMPHATIC FILARIASIS (GAELF)

"Evolving the partnership to meet the challenges ahead"

Background

The Global Alliance to Eliminate LF (GAELF) was founded at its first meeting in Santiago de Compostela (Spain) in May 2000, as a free and non-restrictive forum for discussion and co-ordination of the global effort to eliminate lymphatic filariasis (LF). The WHO served as the secretariat of this partnership.

The aim of the GAELF is to support the Global Programme for the Elimination of Lymphatic Filariasis (GPELF) in achieving the internationally mandated goal of elimination of lymphatic filariasis as a public health problem. The Alliance acts especially through creation of political and societal commitment and the promotion of financial support for the programme through effective advocacy.

The second meeting of the GAELF was held in New Delhi, India, in May 2002, where the medium term challenge to achieve 350 million people covered with Mass Drug Administration in 45 endemic countries by the end of 2005 was agreed. To help achieve this goal, a Task Force for Advocacy & Fundraising was set up.

An "ad-hoc representatives meeting" was held in December 2002 at Liverpool (UK) to take forward the reports of the working groups of the second GAELF. The meeting discussed the critical issues through a consultative process that involved representation from the endemic countries, regional PRGs and other partners. A chairman of the GAELF was appointed, a new enlarged and collegial secretariat was created and an additional Task Force for Communications, including preparation of the Cairo meeting, was established. Specific Terms of Reference of the Chairman, the enlarged secretariat and the two Task Forces were drawn up and are available at pages 41-44 of the Annual Report 2002 of the Global Programme to Eliminate Lymphatic Filariasis. A report of the Liverpool meeting was circulated to all Alliance members and is available on the Global Alliance website. The ad-hoc secretariat was charged to recommend to the next meeting of the GAELF in March 2004 in Cairo, Egypt, an efficient working mechanism which would successfully overcome the challenges facing the Alliance in advocacy and the mobilization of the resources necessary to scale-up.

All the reports of the three above-mentioned meetings and the Annual Reports are available for consultation at the web site of the GAELF: www.filariasis.org.

The brief history outlined here gives a sense of the great dynamism of the global effort to eliminate this disease during its first years. The endemic countries that initiated LF elimination programmes have achieved spectacular progress. From 2 million people covered by MDA in 12 countries in 2000, close to a 130 million people in 38 countries have been reached in 2003, with very good coverage in the vast majority of the implementation units.

To sustain this rate of scaling up and achieve the goals of covering 350 million people by MDA by the end of 2005 and one billion by end 2010 (see the Strategic plan for LF Elimination, www.filariasis.org) a new approach is necessary by the endemic countries and by the supporting international community. Currently a revision of the ambitious targets of the Programme is on going, with the involvement of all the endemic countries.

The idea of having a common repository of funds does not now seem to be practical. Presently, competition for funds exists across many global health initiatives and the attention of the global public health arena is dominated by the fight against HIV/AIDS, TB and malaria, supported by the creation of The Global Fund.

The ownership of the national programmes by the respective endemic countries has to be translated/extended to their role to mobilise the necessary resources, both internal and external. Essential will be creation of new national and local partnerships, raising the profile of the national LF elimination programmes within the framework of the Millennium Development Goals, health systems development and the fight against poverty as well as other neglected diseases affecting the poorest of the poor.

The LF community has recognised that a necessary difference exists in terms of responsibility, roles and function between the Global Programme and the Global Alliance. Such a distinction is a common feature of many health alliances. In the Global Programme, programmatic responsibility rests with country Programme Managers responsible to the Ministers of Health. The technical support to these programmes flows through WHO Country Offices, Regional Offices and HQ as the main implementing agency of the Global Programme with responsibility for the appointment of an independent Global Technical Advisory Group (TAG) and Regional Programme Review Groups which reflect the devolved decision making/advisory processes on country programme plans including the applications and re-applications for drug donations

Recommendations

The GAELF has always shown a preference for a light structure to conduct its business in supporting the Global Programme. Other partnerships might need larger boards because of the nature and size of their constituencies or because of legal requirements. We do not need to have the same structure with associated high costs. The following proposal retains GAELF's emphasis on a light structure while guaranteeing that the necessary actions to execute the recommendations of Global Alliance meetings will take place.

1. The Alliance, which is represented by the endemic countries and other partners, forms the body that decides the policies and scope of its activities. The Alliance will meet once every two years to review the progress and stimulate the international as well endemic country commitment toward the elimination of LF. A President of the Alliance shall be appointed at each Alliance meeting.

2. In order to distill and focus the broad directions given by the Alliance, the Secretariat recommend to set up a Representative Contact Group, which should meet on the last day of each Alliance meeting as a business session of

the Alliance itself. This Group should be composed of two country representatives from each of the Regional PRG groups, the chairs of the Regional PRGs, and two representative members each from the following constituencies: pharmaceutical industry, academic/research institutions, donors, non-governmental organizations and WHO. The Representative Contact Group will translate the vision, policies and recommendations of the Alliance into a work plan with priorities for the Executive Group for the period up to the next Alliance meeting. A discussion forum will be created on the website of the Alliance to ensure continuity and discussion between members of this Group.

3. At the second meeting of the Alliance in 2002, one of the working groups that deliberated on Global Partnership recommended the formation of an executive working group (refer: Report of the second meeting of the GAELF: p.78). The Secretariat recommends forming an Executive Group (EG) of 6 members with the required skills, commitment and resources to get the work done. The Representative Contact Group will appoint members of the EG at the Business Session of GAELF3. The choice of members would be from those who can commit substantial time and energy, including attendance at a minumum of two meetings of the EG every year. They should also be available to further the cause of the Alliance in advocacy, communication and support of fundraising efforts for the endemic countries. One of the EG members would be designated in the Business Session as the Chair to lead the EG. The EG may establish and nominate the membership of *ad hoc* Task Forces (e.g. for advocacy, fundraising, planning and communications). Staff expert resources will be essential for the effective working of the EG and it is anticipated that these people will continue to be provided by partners, Support Centers and contractors. Emphasis will be on increased fundraising, advocacy and communication activities.

The administrative and logistic support for the functioning of the EG will be provided by one of the institution members of the Alliance as an in-kind service. It is estimated that a budget between US$ 1.5 to 1.8 million for a two-year period will be required to support meetings, fundraising and communication activities. This would include holding the large Alliance meeting once every two years.

GAELF Secretariat

February 12, 2004

See next page for a Summary Table of Proposed GAELF Changes

CURRENT GAELF STRUCTURE *Transitional structure agreed at Liverpool 2002*	**PROPOSED CHANGES** *For approval at GAELF3 in Cairo, March 2004*
Full Members Meeting held every two years	Also **create a "Representative Contact Group"** *(tentative name)* of around 30 people representing key GAELF member groups. Convene at the GAELF Business Session each two years. Maintain contact between meetings via electronic Discussion Forum. *Purpose: Provide feedback on member recommendations and priorities for the Alliance to work on over the next two years*
5-person Secretariat (GAELF Chair, Chairs of the two Task Forces and two members from WHO) Who were these?	**All five members will now step down at the Cairo Meeting (GAELF3) and the Secretariat will disband and hand over to group below** **Create an "Executive Group" of six people who** can do the work of the Global Alliance **Appoint a chair** Meet 2 or more times per year **Create sub-working groups as necessary to** focus on specific tasks e.g. fundraising & partnership-building, communication & advocacy, planning etc. *Purpose: Enhance effectiveness of national, regional and global fundraising, advocacy, communication and planning*
Two Task Forces 1. Advocacy & Fundraising 2. Communication	**Disband both current Task Forces at the Cairo** Meeting and combine their work under the umbrell of the new Executive Group (see above) *Purpose: Increase coordination and sharing of resources*
WHO provides administrative support for the Secretariat	**Administrative support to be provided by a GAELF Partner institution** *Purpose: Free up WHO resources to concentrate on Global Programme activities*
Chairman, Global Alliance	**Appoint President, Global Alliance** *Purpose: Title change to avoid confusion with Executive Group Chair*