



# The PacELF Way

**towards  
the elimination  
of lymphatic filariasis  
from the Pacific**

**1999–2005**

**Prepared by PacELF**



World Health Organization  
Western Pacific Region







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## Abbreviations

Ae.	Aedes	KAP	knowledge, attitudes, and practices
Ag	antigen	L1	first-stage larvae
ALB	albendazole	L2	second-stage (or sausage-stage) larvae
AM	Annual PacELF Meeting	L3	third-stage (or infective-stage) larvae
An.	<i>Anopheles</i>	L4	fourth-stage larvae
AusAID	Australian Agency for International Development	LF	lymphatic filariasis
CB	coordinating body	LQAS	lot quality assurance sampling
CDC	Centers for Disease Control and Prevention (Atlanta, Georgia, United States of America)	MDA	mass drug administration
Cx.	<i>Culex</i>	ME	midterm evaluation
DEC	diethylcarbamazine	Mf	microfilaria
DDT	dichlorodiphenyltrichloroethane	MOH	Ministry of Health
DIS	data information system	NGO	non-governmental organization
DOH	Department of Health	PacCARE	PacELF Coordinating and Review Group
ELISA	enzyme-linked immunosorbent assay	PacELF	Pacific Programme to Eliminate Lymphatic Filariasis
GA	Global Alliance	PacMAN	PacELF Monitoring and Analysis Network
GPELF	Global Programme to Eliminate Lymphatic Filariasis	PCR	polymerase chain reaction
GSK	GlaxoSmithKline	PICTs	Pacific Island countries and territories
HQ	headquarters	PRG	Programme Review Group
ICT	immunochromatographic test	RAK	rapid assessment kits
IEC	information, education, and communication	SPC	Secretariat of the Pacific Community
IgG4	immunoglobulin type 4	TAG	Technical Advisory Group
JICA	Japan International Cooperation Agency	UNV	United Nations Volunteer
JOCV	Japan Overseas Cooperation Volunteer	VSO	Voluntary Service Overseas
		<i>W. bancrofti</i>	<i>Wuchereria bancrofti</i>
		WHA	World Health Assembly
		WHO	World Health Organization

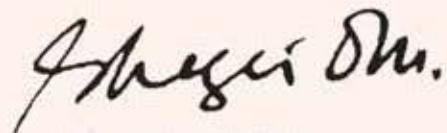
## Foreword

The Pacific Programme to Eliminate Lymphatic Filariasis (PacELF) is leading the way in the battle to rid the world of lymphatic filariasis and the threat posed by the disease to 20% of the world's population. Since the launching of the programme in 1999 by the 22 Pacific Island countries and territories, WHO, and other partners, it has achieved great progress towards eliminating lymphatic filariasis in the Pacific, setting an example for the rest of the world to follow. PacELF was the first regional network to set a date for the elimination of lymphatic filariasis, its target date of 2010 is 10 years before the global target date.

The publication of the *The PacELF Way: Towards the Elimination of Lymphatic Filariasis from the Pacific, 1999–2005* is timely. The programme is at its halfway point, and its elimination target looks well within reach. The dramatic reductions in the prevalence of lymphatic filariasis seen in several countries in the Pacific after mass drug administration show other countries in the Region and worldwide what they may achieve by coordinating and collaborating closely towards a common goal.

This book was produced by the PacELF Home Office team and edited by Kazuyo Ichimori, WHO Scientist and PacELF Team Leader, with technical support from Patricia Graves, CDC. It traces the history of PacELF and describes its strategy, activities, and progress in the 22 Pacific island countries and territories in the network.

We trust this book will inspire all those who are fighting to eliminate lymphatic filariasis, to persevere in their efforts against this debilitating disease.



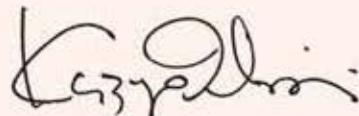
Shigeru Omi, MD, Ph.D.  
Regional Director

## Preface

*The PacELF Way: Towards the Elimination of Lymphatic Filariasis from the Pacific, 1999–2005* records the intense commitment and cooperation of the member countries of the Pacific Programme to Eliminate Lymphatic Filariasis (PacELF) in its first six years. It presents evidence of the noteworthy impact and success achieved halfway through the programme, and points out the challenges that still remain.

We hope that community leaders, field staff, programme managers, policy-making and planning officers, health professionals, scientists, and students interested in lymphatic filariasis elimination and disease control programmes in general will find this book useful in programme implementation, strategic planning, and research. The world has much to learn from the lessons in international cooperation and management in the Pacific contained in this book.

*The PacELF Way* shows that the people involved, their motivation and active participation, are the key to eliminating this communicable disease. PacELF owes its success to collaboration between small island countries separated by a vast ocean, working towards a common goal.



Kazuyo Ichimori, Ph. D.  
PacELF Team Leader  
Fiji  
March 2006

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This book was made possible by the support and valuable contributions of many individuals and organizations. Many thanks to the following:

The country data are the property of the 22 countries and territories that form PacELF and are presented with their permission:

Department of Health, American Samoa

Ministry of Health, Cook Islands

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Ministry of Health, Fiji

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Direction des Affaires Sanitaires et Sociales, New Caledonia

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Ministry of Health, Tonga

Ministry of Health, Tuvalu

Ministry of Health, Vanuatu

Agence de Santé, Wallis and Futuna

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Professor Manabu Sasa, author of the classic book *Human Filariasis*, whose comprehensive knowledge and inspirational teaching were very influential in the formation of PacELF.

# Overview



The Pacific Programme to Eliminate Lymphatic Filariasis (PacELF) is working with 22 Pacific Island countries and territories to rid the Pacific region of the disease. This book describes the work of PacELF since the programme was launched in 1999 up to the end of 2005.

The book is divided into two main parts. Part 1 narrates the genesis of PacELF as a regional programme in the Pacific, its work of mass drug administration (MDA) and other activities, the encouraging successes achieved to date, and the challenges that remain. The contents of the chapters in Part 1 are described briefly below.

Part 2 is arranged by country and gives detailed information on individual country programmes, based mainly on data from the annual reports and meeting presentations of the PacELF member countries. Part 2 also contains many photographs of the programme and its staff in action.

The book closes with a bibliography of references cited in the book and relevant other references published in 1994 to 2004.

Chapter 1 gives some background on lymphatic filariasis worldwide, as well as on its biology, pathology, epidemiology, and vectors; methods of diagnosis; and available drugs to treat the disease. The Global Programme to Eliminate Lymphatic Filariasis (GPELF) is also described. PacELF and GPELF are using combination therapy with diethylcarbamazine (DEC) or ivermectin and albendazole in sustained MDA campaigns with high coverage for at least five years to eliminate lymphatic filariasis. They are helped in this challenging task by new diagnostic tests for filariasis antigen, which give immediate results and can be performed at any time of day, even at night, in areas with nocturnally periodic filariasis.

Chapter 2 gives specifics about the types of filariasis in the Pacific region and how they are transmitted. *Wuchereria bancrofti* is the only species found here, but it occurs in at least two distinct types: nocturnally periodic and diurnally sub-periodic, according to the time of day when microfilariae are present in the peripheral blood. The nocturnally periodic form present in Micronesia and Melanesia is transmitted by *Culex* and *Anopheles* mosquitoes, respectively, while the sub-periodic form in Polynesia is transmitted by the highly efficient vector *Aedes polynesiensis* and other *Aedes* species.

Chapter 2 also reviews the filariasis control programmes before PacELF. Because the disease used to be very highly prevalent in the region, mass drug distribution campaigns using DEC alone have been extensive and long-lasting in several countries including American Samoa, Fiji, French Polynesia, and Samoa, and have been waged as well, but on a more limited scale, in other countries like Papua New Guinea. These earlier campaigns informed later activities. A summary of their results leads into an account of how and why the PacELF programme started, and how it is different from the earlier efforts.

PacELF's goals for elimination in the Pacific, its strategy for reaching those goals, the operational planning needed to carry out the strategy, and the timeline of activities are all spelled out as well in Chapter 2. A detailed monitoring and evaluation plan and a description of the types of blood survey carried out are included here. The plan calls for blood surveys to be done at baseline, after two or three MDAs, and after five MDAs, to assess the prevalence of the filariasis antigen. Further surveys among young children will uncover new infections.

Chapter 3 describes PacELF activities in detail. The PacELF home office has many roles: it is a channel of communication, a global advocate, a stock and supply agent, a meeting organizer, a data manager, and a general encourager and supporter of all the country programmes. PacELF also helps countries produce appropriate health promotion materials, examples of which are shown in this chapter.

The progress and impact of PacELF's activities to date are described in Chapter 4. The section on progress addresses how well activities have been delivered, and the section on impact assesses how PacELF has affected the prevalence of filariasis. The economic costs of MDA treatment in the years 2001 to 2004 are estimated at \$58 per person. The impact of PacELF on knowledge of the disease and on health is also examined, as are the more intangible effects on health, society, and politics in the member countries.

The first thing that PacELF did was to present a clear picture of the endemicity of filariasis in the Pacific at the start of the programme. Ninety-two percent of the 8.6 million or so people in the Pacific were at risk, and 6.5%, or about 500,000, were infected with lymphatic filariasis. Of the 22 Pacific Island countries and territories, six no longer had filariasis and in five others the disease was only partially endemic (transmission occurred only in limited areas of the country). The 11 countries where filariasis was still endemic became the focus of MDA programmes, starting with Samoa in 1999. Most of these 11 countries are in Polynesia and Melanesia.

#### Summary:

▪ Countries participating in PacELF .....	22
▪ Number of endemic countries .....	11
▪ Number of partially endemic countries .....	5
▪ Number of non-endemic countries .....	6
▪ Total population in countries participating in PacELF .....	8.6 million
▪ Total population at risk (all endemic and partially endemic countries) .....	7.9 million
▪ Total population targeted for MDA .....	6.2 million (79% of people of PNG and 100% of all other endemic countries and Wallis and Futuna)
▪ Estimated number of people infected .....	500,000

All of the 11 countries and one country where filariasis is partially endemic have started MDA programmes; five had completed five rounds by 2004. By the end of the programme, 6.2 million people will have received five rounds of MDA. MDA coverage in the last five years has ranged between 69% and 75%. More than 80 million DEC tablets and 6 million albendazole tablets have been distributed through PacELF to member countries. In addition, more than 200,000 ICT cards have been used in blood surveys in the region.

The prevalence of filariasis antigen was dramatically reduced after five rounds of MDA, by an average of 85%, in two PacELF countries, Niue (from 3.1% to 0.2%) and Samoa (from 4.5% to 1.1%). The antigen test overestimates by two- to fourfold the number of microfilaria carriers, which went down from 1.1% to 0.4% in Samoa. Six other countries had their antigen prevalence reduced between the initial survey and the follow-up survey after MDA in sentinel sites.

Chapter 5 reviews the highlights and constraints of the PacELF programme so far, suggests reasons for the successes achieved through the "PacELF way", and discusses the next steps in the programme. Even though MDA programmes are not complete, the prevalence of filariasis has been significantly reduced in most PacELF countries. But several challenges remain. MDA programmes that are still in progress, especially in Papua New Guinea, must be sustained and greater efforts must be made to control morbidity, treat lymphoedema and hydrocoele, and control mosquito vectors, especially the highly efficient vector *Aedes polynesiensis*. All the remaining "hot spots" of filariasis in remote island communities must be found. These and other hurdles must be overcome before the disease can be truly considered eradicated.





# Background

## LYMPHATIC FILARIASIS

### BIOLOGY

Lymphatic filariasis is a disease caused by parasitic infection with a nematode worm that lives in the human body. The parasite is transmitted from one person to another by an intermediate mosquito host. About 20% of the world's population in the tropics and subtropics is at risk of infection with lymphatic filariasis.

*Wuchereria bancrofti*, *Brugia malayi*, and *Brugia timori* are three species of nematodes that live in the lymphatic vessels of humans and cause lymphatic filariasis. Of the three, *W. bancrofti* is the most widely distributed and is responsible for 90% of lymphatic filariasis infections worldwide. The less common *Brugia* species of filariasis are distributed over parts of South and East Asia. *W. bancrofti* is the only species found in the Pacific and is the focus of this book. Humans are the only reservoir for Bancroftian and most Brugian filariasis, though cats and certain monkeys can also be infected with some Brugian parasitic worms.

Adult *W. bancrofti* worms (macrofilariae) are about the thickness of a human hair and average 25–100 mm long, with male worms being shorter than females (Figure 1-1). The adult

worms live in "nests" in the lymphatic vessels and nodes. Male and female worms sharing a nest reproduce sexually and release millions of microfilariae (Mf) into the blood. The Mf of *W. bancrofti* are 0.2–0.3 mm long, snake-like, and enclosed in a sheath (Figure 1-2).

*W. bancrofti* worms have different physiologic types. The two main types can be distinguished from each other by the periodicity of Mf in the blood. Each type is transmitted by a different group of intermediate mosquito hosts, and the periodicity of Mf coincides with the biting patterns of the disease-transmitting mosquitoes.

Mf of the periodic type appear and disappear from the peripheral blood on a daily cycle. In the nocturnally periodic type of *W. bancrofti*, Mf are in their highest numbers in the blood between 22:00 hours and 02:00 hours. When not circulating in the peripheral blood, Mf are found in blood nearer to the lungs. The sub-periodic type also has a daily cycle, but not as well defined as that of the periodic type. Microfilariae of diurnally sub-periodic *W. bancrofti* circulate in the peripheral blood at all times, but more are present in the blood during the daytime than at night.



Figure 1-1

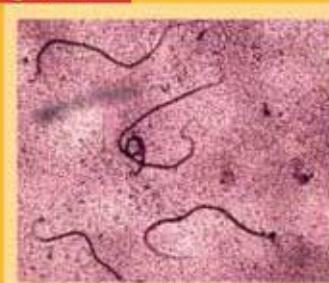


Adult of *W.bancrofti*

Source: WHO

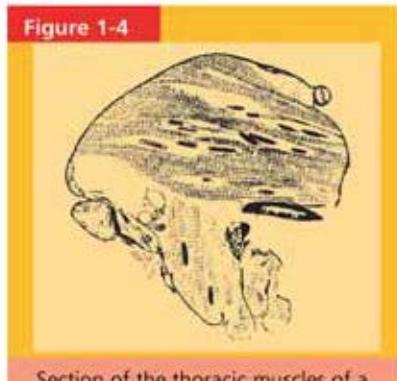
<sup>1</sup> www.filariasis.org

Figure 1-2



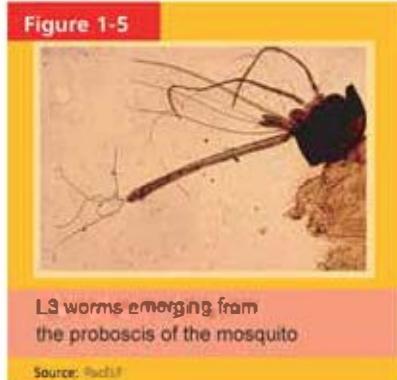
*W.bancrofti* microfilariae in human blood

Source: PacELF



Section of the thoracic muscles of a mosquito with L2 worms

Source: R.C. Manson-Bahr and D.R. Bell, *Manson's Tropical Diseases*, (1997)



L3 worms emerging from the proboscis of the mosquito

Source: PacELF

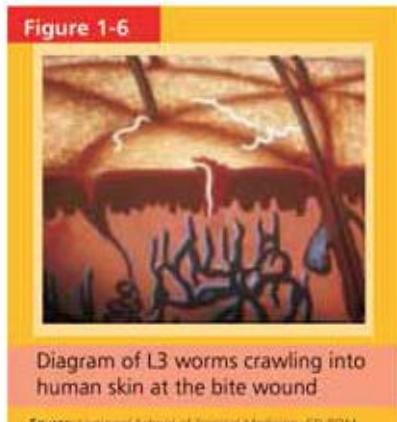
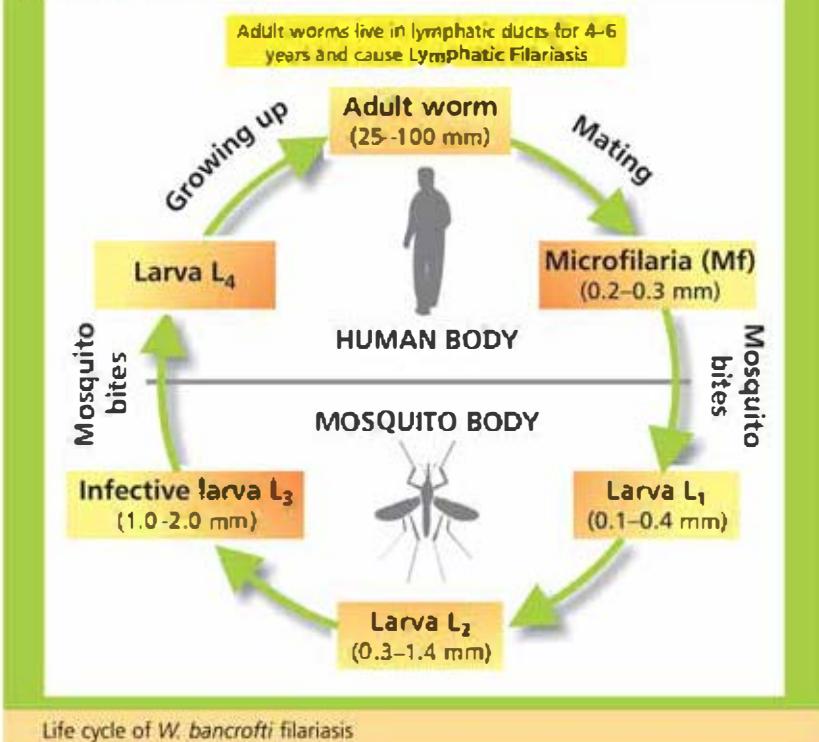


Diagram of L3 worms crawling into human skin at the bite wound

Source: Liverpool School of Tropical Medicine, CD-ROM

Figure 1-3



Life cycle of *W. bancrofti* filariasis

Source: PacELF

## LIFE CYCLE

Adult *W. bancrofti* worms start to release Mf into the blood about a year after infecting the human host. A pair of adult worms can produce millions of Mf in their lifetime. Microfilariae may be found in other areas of the body such as hydrocoele fluid, chylous urine, lungs, and lymph nodes, but it is in the circulating peripheral blood where they can be ingested by feeding mosquitoes. Microfilariae that are not ingested by mosquitoes usually die after about six to nine months.

Figure 1-3 shows the life cycle of *W. bancrofti*. Once taken up by a mosquito in its blood meal, the Mf penetrate the mosquito's midgut wall and migrate to the thoracic muscles, where the larvae develop (Figure 1-4). *Wuchereria bancrofti* Mf pass through three larval stages—the first stage (L1), second (or sausage) stage (L2), and third (or infective) stage (L3)—over a period of about two weeks. The L3 worms

move from the thoracic muscle into the body of the mosquito. When the infected mosquito next bites a person, these L3 worms emerge from the mouthparts (Figure 1-5) and drop onto the person's skin. The worms then crawl through the bite wound, inside the skin of the new human host (Figure 1-6).

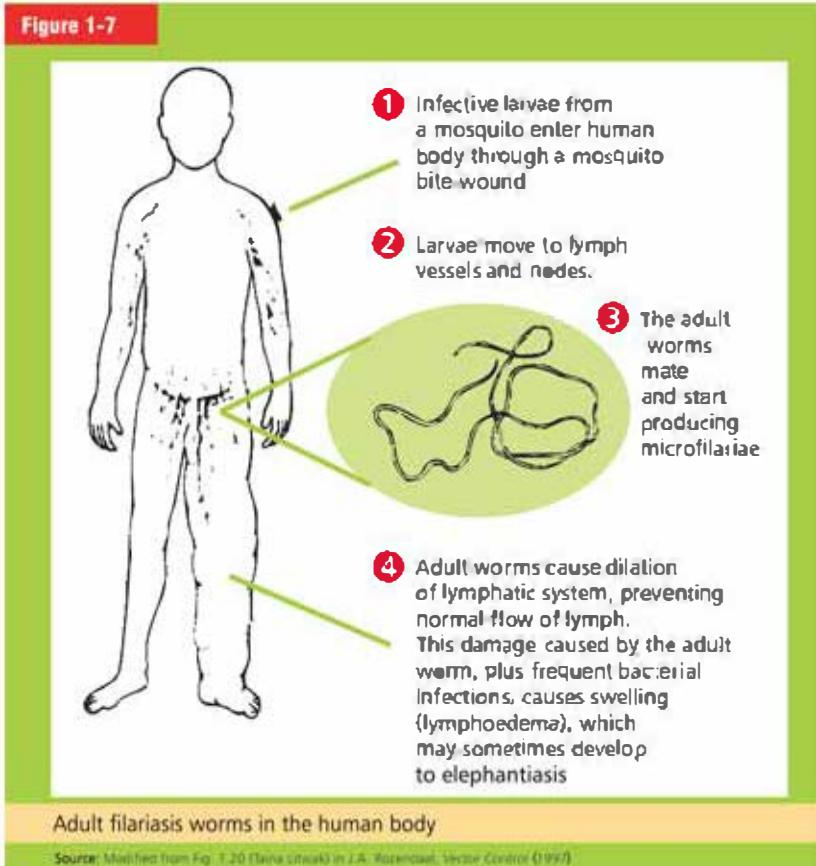
The L3 worms develop through a fourth stage (L4) while they migrate through the human body to the lymphatic vessels and lymph nodes, where they develop into adult worms. L4 worms may take up to a year to mature into adults, after which they are able to release Mf into the blood, completing the life cycle. Adult *W. bancrofti* are thought to live for an average of four to six years in the human host but the actual lifespan of the adult worm is not completely known.

## PATHOGENESIS

Clinical presentations of lymphatic filariasis infections can be asymp-



Figure 1-7



tomatic, acute, or chronic. At least half of all persons infected with lymphatic filariasis show no signs of the disease, although they may have circulating Mf. These infected individuals may or may not eventually develop overt manifestations. Asymptomatic infections are associated with an altered immune system and hidden damage to lymphatic vessels. Many asymptomatic cases of lymphatic filariasis have damage to the kidneys that shows up as microscopic blood or abnormal quantities of protein in the urine.

Acute presentations include "filarial fevers" or acute attacks associated with inflammation of the glands or lymph nodes, lymphatic vessels, or connective tissue under the skin. The inflammatory episodes are caused by dead or dying adult worms or, more commonly, by secondary bacterial or fungal infections of tissues damaged by filariasis. These organisms get into the tissues through cuts or small breaks in the skin.

Chronic manifestations of the disease arising from adult worm damage to the lymphatic system include hydrocoele, lymphoedema, chyluria, and elephantiasis (Figure 1-7). In *W. bancrofti* infections, the scrotal lymphatics are the preferred site for adult worm nests, but the nests may be found elsewhere in the lymphatic system as well. Hydrocoele, a swelling caused by accumulation of fluid in the tunica vaginalis of the scrotum, is the most common clinical manifestation of lymphatic filariasis (Figure 1-8). Lymphoedema, or swelling due to the build-up of fluid in the tissues, is illustrated in Figures 1-9 and 1-10. Dilatation of the lymphatics in the bladder and kidney can cause rupture leading to chyluria (milky urine).

Secondary infections and repeated inflammation during acute attacks continue to damage the lymphatic system and thicken and harden the skin. In some cases leading to elephantiasis.

Figure 1-8



Hydrocoele in the Pacific

Source: Fiji Ministry of Health

Figure 1-9



Lymphoedema in arm

Source: Fiji Ministry of Health

Figure 1-10



Lymphoedema in leg

Source: American Samoa Department of Health

**Table 1-1: Geographical distribution of *W. bancrofti* and its principal vectors**

Species and race	Endemic Area	Principal Vectors
Nocturnally periodic <i>W. bancrofti</i>	Africa	<i>Anopheles, Culex</i>
	America	<i>Culex</i>
	Egypt	<i>Culex</i>
	Asia	<i>Culex, Anopheles, Aedes</i>
	South-East Asia	<i>Culex</i>
	Western Pacific	<i>Anopheles, Culex</i>
Diurnally sub-periodic <i>W. bancrofti</i>	Asia-Western Pacific	<i>Aedes, Othiorotatus</i>

Source: WHO (1992)

(Figures 1-9, 1-10, 1-11, 1-12, and 1-13). Minimizing acute attacks by preventing secondary bacterial or fungal infections—one of the main goals of managing lymphatic filariasis—prevents these disfiguring consequences.

Sometimes the host immune response to Mf is so strong that severe inflammation destroys tissue in the lungs and leads to permanent lung disease. This condition is called tropical pulmonary eosinophilia. Patients with

this condition have symptoms of asthma and cough, and have high levels of eosinophils and filarial antibodies in the blood.

## TRANSMISSION

Lymphatic filariasis is transmitted from one human to another by mosquitoes. The parasite requires an intermediate host, where microfilariae develop through the larval stages. The type of vector mosquito depends on geography, the periodicity of the parasite, and mosquito biting patterns. The periodicity may be a selective adaptation to the mosquito biting cycle.

Table 1-1 shows the main vectors associated with *W. bancrofti* by geographic area. The most important vectors in the Pacific are *Anopheles* species in Papua New Guinea and Vanuatu, *Culex quinquefasciatus* in Micronesia, and *Aedes (Ae.) polynesiensis*<sup>1</sup> from Fiji through Polynesia. *Ae. tabu* and *Ae. cooki* are the vectors of filariasis in Tonga and Niue, respectively.

The Mf maintain a delicate relationship with the mosquito vector. The size, location, and movements of the filarial larvae affect vector performance, and too many Mf ingested at one time can kill the vector. Characteristics of the mosquitoes can also affect the larvae. While up to 20 Mf may mature to the infective L3 stage in the mosquito, larvae can be destroyed

Figure 1-11



Elephantiasis

Source: Kiribati Ministry of Health

Figure 1-12



Elephantiasis

Source: Samoa Ministry of Health

Figure 1-13

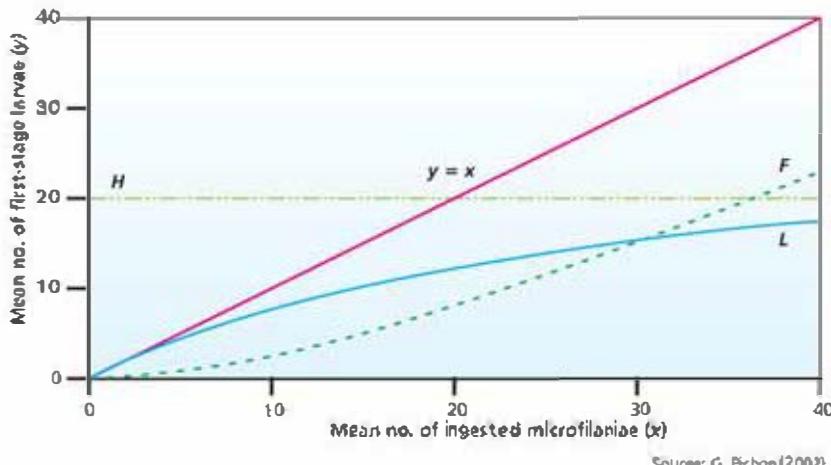


Elephantiasis

Source: Vanuatu Ministry of Health

<sup>1</sup> Some authors refer to the *Aedes* species in the Stegomyia group as the genus *Stegomyia*.



**Figure 1-14:** Diagrammatic representation of limitation (L) and facilitation (F)

Source: G. Pichon (2002)

In the mouthparts of the mosquito or by its immune system.

In *Aedes* vectors of filariasis, ingested MI that reach the hemocoel make the stomach wall less permeable to other Mf. Therefore, by a process known as "limitation", the proportion of Mf that successfully develop to the L3 stage increases if the mosquito ingests fewer Mf (Figure 1-14). In contrast, in the *Anopheles* mosquito the proportion of MI that reach the L3 stage decreases as the mosquito ingests fewer MI (process of "facilitation"), making it easier to interrupt transmission of lymphatic filariasis by *Anopheles* mosquitoes than transmission by *Aedes* mosquitoes. Because of facilitation, reducing Mf density (through mass drug administration with diethylcarbamazine and albendazole, for example) below a critical equilibrium between adult worms and MI will eliminate the parasite population. But in areas with limitation, it would be much harder to eliminate the transmission by reducing Mf density through MDA. For this reason *Ae. polynesiensis* presents a challenge to the elimination efforts of areas in the Pacific with diurnally sub-periodic *W. bancrofti*.

Areas where there is transmission of lymphatic filariasis can be determined either by diagnosing infections in the human population (see next section)

or by collecting mosquitoes and testing for the presence of lymphatic filariasis worms. The presence of L3s in the mosquito population indicates that the mosquitoes are transmitting the parasite to the human population. Using the mosquito population to determine if people are still infected with Mf is called "xenomonitoring". Instead of testing individuals for evidence of MI infection, xenodiagnosis involves sampling the mosquito population, usually by collecting mosquitoes inside houses, and then assaying for lymphatic filariasis worms through dissection or polymerase chain reaction (PCR) tests. If mosquitoes are found positive for lymphatic filariasis, some humans in the area are still infected with Mf.

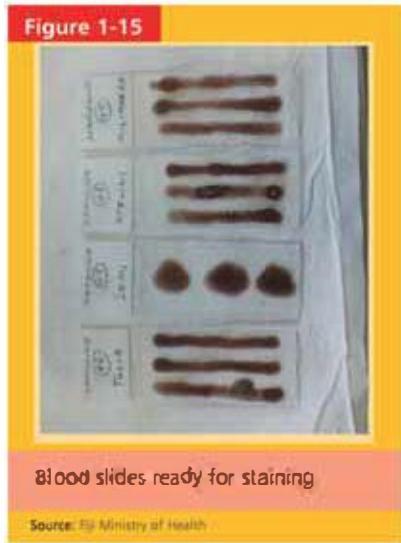
## DIAGNOSTICS

*W. bancrofti* is most commonly diagnosed when Mf or parasite antigen is detected in the blood. Filarial antibody and DNA could also be detected. A small amount of blood is collected for all of these diagnostic tests.

### Blood slides

Microfilariae are detected through microscopy of a finger-prick sample of blood on a slide that is then stained with Giemsa. The presence of MI is direct evidence of infection, but the absence

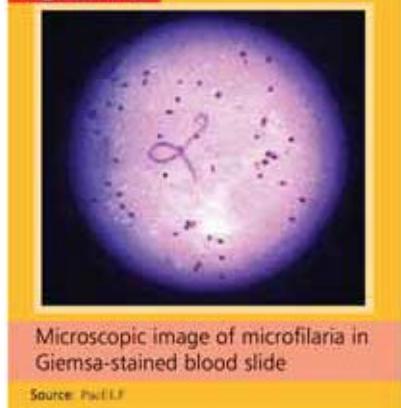
**Figure 1-15**



Blood slides ready for staining

Source: Fiji Ministry of Health

**Figure 1-16**



Microscopic image of microfilaria in Giemsa-stained blood slide

Source: PacELF

of Mf does not rule out infection. Microscopy does not detect the presence of *W. bancrofti* adult worms that are not producing Mf. This method is most sensitive when Mf are circulating in the peripheral blood. Therefore, in areas with nocturnally periodic lymphatic filariasis, blood must be taken in the middle of the night. The intensity of infection can be estimated by counting the Mf in a measured amount of blood.

In Figure 1-15 two standard amounts of blood have been used: 20 µl of a finger-prick sample in a round drop on a glass slide, and 60 µl of a finger-prick sample in three lines on a glass slide. Figure 1-16 shows how Mf look on a blood slide stained with Giemsa.

A third way of testing for Mf in blood is by filtering 1 ml blood samples through a membrane (Nucleopore filter).

**Figure 1-17**



Filarisis ICT rapid assessment kit

Source: PacELF

**Figure 1-18**



Filarisis ICT test cards showing negative and positive results

Source: PacELF

for example). This method is highly sensitive, but again does not detect adult parasites that are not producing Mf; and in areas where nocturnal periodic *W. bancrofti* is endemic, blood must be taken at night.

### Antigen detection tests

Circulating filarial antigen from *W. bancrofti* worms can be detected in the blood. Two tests can detect the antigen: enzyme-linked immunosorbent assay (ELISA) and the immunochromatographic test (ICT). Both tests detect circulating adult worm antigen and are highly sensitive and specific. Antigen tests do not depend on the periodicity of the parasite, so blood can be sampled anytime in the day. In addition, these tests detect infections even if adult worms are not producing Mf.

The ELISA test detects a specific antigen called Og4C3. This can be done only in the laboratory, but large batches can be tested at once. Blood for this test can be collected in dried spots on filter paper and kept for later testing. The ICT test, on the other hand, is a rapid card test (Figure 1-16) that requires no laboratory equipment and provides results in about 10 minutes, making it ideal for field surveys. Rapid assessment kits (RAK) are available for field survey use; each kit contains 50 ICT cards (Figure 1-17) and the necessary supplies to do the tests including latex gloves, alcohol wipes, lancets, capillary tubes, and a sharp container.

The percentage of positive samples detected through these antigen tests gives the prevalence of antigenaemia. A disadvantage of antigen tests is that patients may continue to be positive even after effective treatment, since antigen may still be detected in the blood for months to years after adult worms and Mf have died. The exact length of time for which antigen persists after treatment is not known.



### Antibody detection tests

Antibody levels in the host rise after infection with or exposure to lymphatic filariasis. The IgG4 sub-type of antibody specifically increases. However, the test cannot distinguish between a current and a past infection. Nevertheless, a high level of antibodies detected in children may indicate recent exposure and infection. For this reason antibody testing may be an effective tool for determining if filariasis transmission has been interrupted.

### Polymerase chain reaction tests

The PCR test detects parasite nucleic acid, but it requires complicated and expensive laboratory equipment. A test result is positive when nucleic acid of Mf is detected in the blood. The PCR test is highly sensitive and specific. It can also be used to detect the L3 infective stage in the mosquito.

The features of the foregoing diagnostic tests are compared in Table 1-2.

## CONTROL MEASURES

Filariasis control has a twofold objective: to reduce the number of infections, and to stop further transmission. The control measures available are drugs (either used individually or for mass treatment) and vector control. Drug treatment of infections will achieve both objectives, while vector control will reduce the number of new infections.

### Drugs

Three drugs are available for the treatment and control of filariasis: diethylcarbamazine (DEC), albendazole, and ivermectin. All three have been used for many years and have well-established safety records. DEC is inexpensive, and donations from drug manufacturers have made albendazole and ivermectin affordable.

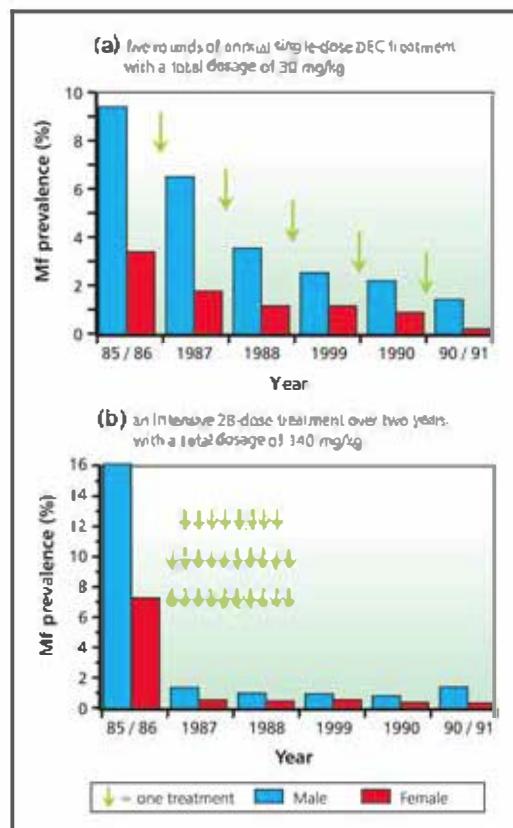
Table 1-2: Characteristics of diagnostic tests for *W. bancrofti*

Test	Target of detection in blood	Field use	Can estimate density	Persists after successful treatment	Sensitivity	Specificity
Blood slide, 20 µl	Mf	(--)	✓	--	Medium	High
Blood slide, 60 µl	Mf	(--)	✓	--	Medium	High
Blood, 1 ml, filtered	Mf	(--)	✓	--	High	High
ICR	Adult worm antigen	✓	--	✓ Months	Very high	Very high
Q94Q	Adult worm antigen	--	(V)	✓ Months	Very high	Very high
Antibody (IgG4)	Antibody indicating past or current infection	--	--	✓ Months or years	High	Low
PCR	Mf	--	--	--	Very high	Very high

DEC is the oldest of the drugs and has been used to treat filariasis since 1947. The exact effect of this piperazine derivative on the adult parasite is not clear. However, Mf are effectively cleared and some evidence suggests that adult worms die as well. DEC may inhibit parasite function, making the host immune system better able to destroy lymphatic worms. Previously, the standard treatment for an infected individual was 12 doses of 6 mg/kg of body weight. However, a study in Fiji (see Figure 1-19) showed that a single annual dose of 6 mg/kg repeated for five years also effectively cleared Mf. Other studies have confirmed the effectiveness of these once-yearly doses.

Albendazole, a benzimidazole carbamate, was originally developed for use against soil-transmitted intestinal parasites, and has been used for this purpose for more than 20 years. It is also effective against lymphatic filariasis. Albendazole inhibits the polymerization of tubulin, which is required for parasite development.

Figure 1-19: Reductions in Mf prevalence with different DEC treatment schedules



Source: E. Kimura and J.U. Mataika (1996)



Another drug, ivermectin, causes long-term reduction of Mf with one dose. It is a macrocyclic lactone. The direct toxic effects of ivermectin on filarial worms are not fully clear, but it probably reduces membrane permeability. Ivermectin is very effective against onchocerciasis, another filarial disease.

Combination therapy with DEC and albendazole (Figure 1-20), or ivermectin and albendazole, is more effective in clearing Mf from the blood than therapy with just one of the three drugs (Figure 1-21). Research has also shown that combination therapy suppresses the production of Mf for a longer period than DEC alone. Furthermore, Mf that are not affected by one drug may be cleared by another drug given in combination. Although resistance has not been documented, treatment with multiple drugs that work differently may give the parasite less opportunity to develop resistance. The drugs also kill other

intestinal worms like hookworm, *Ascaris*, *Trichuris*, and *Enterobius*. These factors make combination therapy suitable for mass treatment programs.

As with any other drug, treatment may have adverse effects. These can be classified into two categories: those caused by the drugs themselves and those resulting from the destruction of Mf and adult parasites. Most adverse effects associated with the chemical effects of the drugs are mild general reactions, such as nausea and vomiting shortly after ingestion, and are independent of infection status.

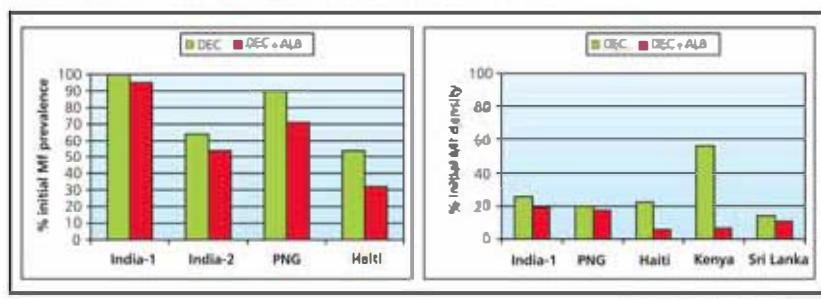
In infected people, antigen is released when the drugs destroy Mf. Cytokines are then produced and immune complexes are formed, resulting in fever, headache, and myalgia. These effects may start hours after ingestion and may last from only a few hours to a few days. Mass treatment may also cause the death of adult worms. Adverse reactions that can result from this include silent or painful nodules in the lymph nodes where adult worms were living. In men this most often results in scrotal nodules. Nodules usually resolve in seven to 10 days. In addition, fever may be provoked by antigen from endosymbiotic gram-negative *Wolbachia* released from dying adult parasites.

### Mass treatment

Filariasis could be effectively controlled if all infected persons were identified and treated. Although ideal, this method cannot be applied in large populations. Over half of *W. bancrofti* infections are asymptomatic, so every individual in an endemic area would need diagnostic testing. This strategy is too costly to be feasible. Therefore, to control filariasis on a large scale, mass treatment strategies are needed.

Mass drug administration (MDA) for filariasis means treating all individuals in an endemic area once a year with DEC and albendazole (or

**Figure 1-21:** Comparative effects of treatment with DEC and with DEC plus albendazole on Mf prevalence and density, at six months after treatment



ivermectin and albendazole). Such MDA rapidly clears *Mf* in infected individuals, thus interrupting transmission. However, some adult parasites may survive and continue to produce *Mf* after the effects of the drugs wear off. The aim of repeated annual MDA is to stop production of *Mf* until all adult parasites die (Figure 1-22). Adult *W. bancrofti* have been estimated to live for an average of five years. Thus, annual MDA must be repeated for about five years to suppress *Mf* production throughout the life of the adult parasite (Figure 1-23).

#### DEC salt

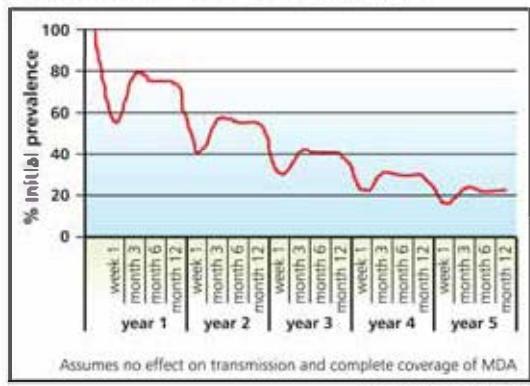
Adding DEC to salt is another possible method of mass treatment for the control of lymphatic filariasis. DEC, just like iodine, can be added to cooking salt to fortify it. China, India, and Tanzania have used DEC salt to effectively reduce community prevalence levels of *W. bancrofti*. The effective concentration should be 0.2%–0.3% by weight of the salt; the actual dose an individual receives cannot be tightly controlled. Local patterns of use of salt must first be determined. Ideally, only DEC salt should be available for use.

#### VECTOR CONTROL

Vector control may increase the impact of other interventions to interrupt filariasis transmission. Appropriate vector control strategies may also continue suppressing filariasis transmission in areas where some infections still remain after other interventions such as MDA have stopped.

The main purpose of vector control is to reduce the number of adult mosquitoes and lessen contact between humans and mosquitoes. Vector control can be directed at either the larval or the adult stage. Source reduction and larvicide with insecticides can be used against the larvae, while space or residual spraying controls adult mosquitoes (Figure 1-24). Mosquito

**Figure 1-22:** Predicted effect on *Mf* prevalence of single-dose DEC administered for five years



Source: Cao et al. (1997)

nets are effective in preventing bites by night-biting species. Long-lasting insecticide-treated materials have great potential for stopping transmission, even perhaps for day-biting species (Figure 1-25).

Over 100 species of mosquitoes are potential vectors of filariasis. Adult mosquitoes of the different filariasis vectors have differences in biology and behaviour that determine appropriate control measures. Some of these differences are: location of oviposition, biting patterns, and flight range. For example, the night-biting *Anopheles* mosquitoes can be prevented from transmitting filariasis if all individuals in the endemic area were to sleep under mosquito nets. Local vector breeding and biting habits must be understood before effective control methods can be developed.

Many of the mosquito control measures used to stop filariasis transmission will also help reduce other diseases such as malaria or dengue fever. In areas with nocturnally periodic filariasis as well as malaria, impregnated mosquito nets and indoor house spraying can protect against both diseases. This is because the same type of mosquito, *Anopheles*, transmits malaria and filariasis. In Polynesian countries, *Aedes polynesiensis* may transmit dengue as well as filariasis, so reducing the numbers of this mosquito will help control both diseases.

**Figure 1-23**



Mass drug administration in Samoa

Source: Samoa Department of Health

**Figure 1-24**



Photograph of residual insecticide spraying

Source: Jim Burkill

**Figure 1-25**



Insecticide-impregnated mosquito nets

Source: PAHO

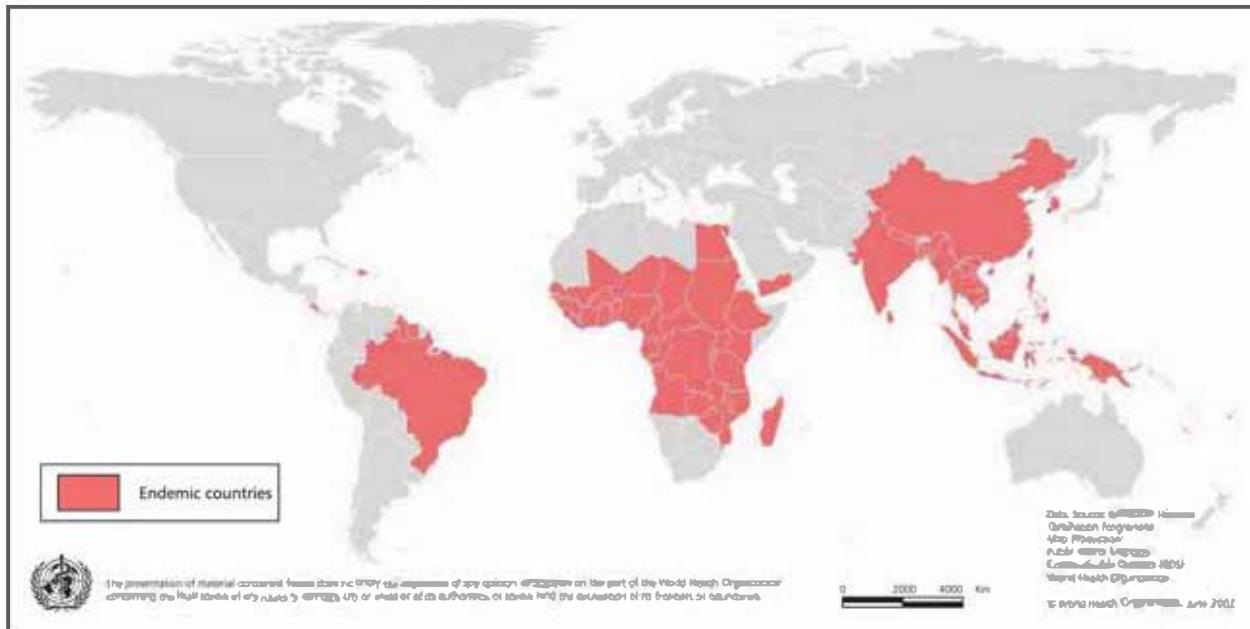


## GLOBAL PROGRAMME TO ELIMINATE LYMPHATIC FILARIASIS

Lymphatic filariasis is endemic in at least 80 countries (Figure 1-26). The disabling clinical manifestations of the disease include lymphoedema, hydrocoele, and elephantiasis. Lymphatic filariasis is the second leading cause of disability worldwide. It causes enormous physical, social, psychological, and economic suffering to those affected. Fortunately, a global

determination of endemic areas. Second, research studies showed that repeated annual doses of DEC were almost as effective as the previous regimen of multiple doses. Finally, studies also provided evidence that the combination of DEC or ivermectin with albendazole was safe and more effective in lowering parasite density than either drug when used alone.

Figure 1-26: Countries and territories where lymphatic filariasis is endemic



effort is under way to eliminate this terrible disease.

### FORMATION OF THE GLOBAL PROGRAMME

In 1993 the International Task Force for Disease Eradication declared lymphatic filariasis to be one of only six eradicable or potentially eradicable diseases. This optimism was based on three developments. First, diagnostic methods for identifying filariasis infection had improved greatly and opened the way for the rapid

The Global Programme to Eliminate Lymphatic Filariasis (GPELF) started after the fiftieth World Health Assembly in May 1997. The World Health Assembly, concerned about the continued prevalence of the disease and the human suffering associated with it, called for the elimination of lymphatic filariasis as a public health problem. In resolution 50.29 the World Health Assembly:

*Urge Member States 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.*

After the World Health Assembly resolution, two major drug companies further boosted the momentum of the programme. Merck & Co. Inc. and GlaxoSmithKline (GSK) agreed to donate ivermectin and albendazole, respectively, for use in the filariasis elimination campaign.

The GPELF first directed its efforts towards building a large network of partners and setting programme guidelines. By the end of 1999, the GPELF had developed a global strategic plan with the goal of eliminating lymphatic filariasis as a public health problem by the year 2020. This GPELF goal rests on these two pillars:

- Interruption of transmission, in most cases through mass treatment of the population; and
- Morbidity control to relieve the suffering of those who already have the disease.

The plan is focused on:

- Stopping the spread of infection (interrupting transmission);
- Relieving and preventing suffering and disability;
- Providing essential technical support; and
- Carrying out strategic operational research.

The GPELF strategic plan sets out a rationale, a timeline, and the resources needed to reach its goal by 2020.

## ORGANIZATION AND FUNCTION

The GPELF consists of the national programmes of all the filariasis-endemic countries, co-

ordinated by the World Health Organization (WHO). The Global Alliance, formally established in 2000 at the first annual GPELF meeting in Santiago de Compostela, Spain, is a forum for information sharing and advocacy for the GPELF. The GPELF Technical Advisory Group (TAG) consists of lymphatic filariasis experts and specialists in programme management. The TAG gives advice on technical issues, and suggests research priorities to the GPELF. There are also regional Programme Review Groups (RPRGs), which review all aspects of country programmes and make recommendations to WHO, GSK, and Merck & Co. Inc. for the provision of drugs and support to the countries.

There are six endemic regions: Africa, America, Eastern Mediterranean, Indian subcontinent, Mekong-Plus,<sup>3</sup> and the Pacific Programme to Eliminate Lymphatic Filariasis (PacELF). Table 1-3 gives a brief description of the burden of lymphatic filariasis in each region. India accounts for about one third of the total estimated infections.

## THE GLOBAL ALLIANCE

The Global Alliance (GA) to Eliminate Lymphatic Filariasis is a free, non-restrictive partnership forum for the

Table 1-3: Regional programmes to eliminate lymphatic filariasis, as of 2003

Region	Endemic countries	Population at risk (millions)	Percentage of at-risk population covered
Africa	39	477	3.5
America	7	9	14.4
Eastern Mediterranean	3	15	17.3
Indian Subcontinent	5	514	5.4
Mekong-Plus	12	214	9.6
PacELF	16	4	30.0

Modified from WHO, Annual Report on Lymphatic Filariasis, 2003

<sup>3</sup> The Mekong-Plus region originally comprised Cambodia, Laos, China, Indonesia, Malaysia, Myanmar, Philippines, Thailand, and Vietnam. In 2005 it became the "New Mekong Plus", which is made up of Cambodia, Laos, China, Malaysia, Philippines, and Vietnam. Indonesia, Myanmar, and Thailand were grouped together with the Indian subcontinent.

Figure 1-27



exchange of ideas and coordination of activities to eliminate lymphatic filariasis (Figure 1-27). Membership in the GA is open to all interested parties. The main functions of the GA are sharing information on the progress and challenges of eliminating lymphatic filariasis, and coordinating fund-raising and advocacy efforts.

Soon after the World Health Assembly resolution in 1997, SmithKline Beecham (now GlaxoSmithKline) pledged to support the global effort by donating albendazole for as long as needed to eliminate lymphatic filariasis. Merck & Co. Inc. made a similar agreement to donate ivermectin for use in areas where onchocerciasis is co-endemic. These two generous donations pushed the global effort forward by dramatically reducing the costs of mass treatment. The Bill and Melinda Gates Foundation added a substantial donation to the GPELF for 2000-2004, in addition to the early support of the Arab Fund for Economic and Social Development and the Governments of the United Kingdom and Japan.

The Global Alliance maintains an active partnership with national ministries of health of endemic countries, international organizations, the private sector, International development agencies, nongovernmental organizations (NGOs), and academic and research organizations. These partners provide the means for

guiding, implementing, and sustaining activities to meet the goal of elimination. The endemic countries implement the elimination activities, and monitor and evaluate the impact of these activities. Private donor organizations provide funds to support the activities within the countries. WHO supports the activities of the ministries of health by providing assistance in all programmatic areas such as action plan development, endemicity mapping, training, social mobilization, and evaluation. Nongovernmental organizations work with national programmes to implement activities and provide local funding. Academic and research organizations provide scientific guidance and conduct operational research.

After its first annual meeting in Santiago de Compostela, Spain, in May 2000, the Global Alliance has met two more times. Discussions first focused on how to support effective country activities. The theme of the second meeting in India in 2002 was empowering the countries to pursue public health development and poverty alleviation by eliminating lymphatic filariasis. At the meeting in Egypt in 2004, members were encouraged by the current progress and challenged to be more active. The next Global Alliance meeting will be held in Fiji, in 2006. The theme of the meeting is "Towards the Global Elimination of Lymphatic Filariasis: Successes and Challenges".



# Filariasis in the Pacific



## THE PACIFIC ISLANDS

The Pacific Ocean is the largest of the world's oceans, covering one-third of the earth's surface and containing about 3000 islands in 22 countries and territories (Figure 2-1). Many of the Islands are classified into three regions: Micronesia, Polynesia, and Melanesia (Figure 2-2). Micronesia is made up of Guam, Kiribati, the Marshall Islands, the Federated States of Micronesia, Nauru, the Commonwealth of the Northern Mariana Islands, and Palau. The Micronesian Islands are scattered throughout the northwestern region of the Pacific. Polynesia extends from the Hawaiian Islands to New Zealand and comprises American Samoa, Cook Islands, French Polynesia, Niue, the Pitcairn Islands, Samoa, Tokelau, Tonga, Tuvalu, and Wallis and Futuna. Melanesia consists of Fiji, New Caledonia, Papua New Guinea, Solomon Islands, and Vanuatu.

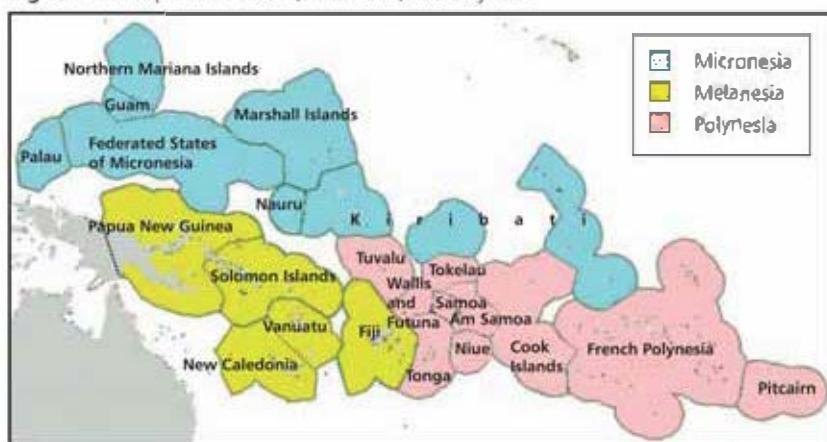
Plate tectonics, and volcanic activity and coral growth formed some Pacific Islands into tropical mountains and others into atolls (narrow rings of coral reef surrounding a central lagoon). The tropical mountain type of island has steep terrain with areas of fertile coastal plains. Although atolls are found throughout the Pacific, the largest concentration of this type of island is in French Polynesia. Most Pacific countries contain mixtures of both types of island.

Figure 2-1: The Pacific Ocean, showing the PacELF countries and territories



Source: South Pacific Applied Geoscience Commission, [www.sopac.org](http://www.sopac.org)

Figure 2-2: Map of Micronesia, Melanesia, and Polynesia



Source: Secretariat of the Pacific Community, [www.spc.int](http://www.spc.int)

The climate varies throughout the Pacific Islands, depending mainly on latitude. Some islands have distinct rainy and dry seasons, while others receive rain all year. Less rain, rather than no rain, usually characterizes dry seasons. The region is prone to natural disasters, especially devastating cyclones, which often strike the Pacific Islands. Earthquakes, volcanic eruptions, and tsunamis are also significant risks.

The Pacific Islanders speak 1000 indigenous languages, composing about 20% of all the languages spoken in the world. In addition to local languages, French is spoken in French Polynesia, New Caledonia, Vanuatu, and Wallis and Futuna, while English is spoken in most of the other islands because of a long history of relations with England, Australia, New Zealand, and the United States of America.

Fisheries, agriculture, mining, and tourism are the main activities supporting the Pacific economy. Most of the farming is subsistence and provides families with daily needs and some income. The beautiful environment encourages tourism, which brings local employment opportunities and compensation for sharing Pacific arts and crafts. Foreign aid plays a significant role in almost all Pacific economies. Australia, New Zealand, and Japan provide the most assistance, while the territories of the United States of America and France are supported by their national governments.

Geographically, these islands are isolated in a vast ocean and seemingly cut off from the rest of the world. Nevertheless, Pacific Islanders travel frequently between islands and maintain close intercultural communications. In the past, travel was made possible by large sailing canoes. Canoes are still kept for daily fishing and transport in most Pacific

countries, but air travel has made off-island travel faster and more frequent.

Each ethnic group is unique with its own dances, songs, art, and ceremonies. However, all share the same respect for traditional community values, are less individualistic, and keep up strong ties with their families and church. The community is always placed above the individual; this makes Pacific Islanders willing to cooperate to solve a common problem. Therefore, the countries and territories in the Pacific work naturally together, and they will help one another eliminate lymphatic filariasis.

The total population of the 22 Pacific Island countries and territories was estimated at 8.6 million in 2004 (Table 2-1). The largest countries are Papua New Guinea, with a population of 5.6 million, and Fiji, with a population of about 836 000. These two countries are much larger than the other islands. The Pitcairn Islands has about 50 people. Niue and Tokelau each have fewer than 2000, and Nauru and Tuvalu each have about 10 000. Many Pacific Islanders live overseas in New Zealand, Australia, Hawaii, and other countries, but visit home frequently. Some island countries have declining populations of full-time residents.

According to estimates of the Secretariat of the Pacific Community (SPC),<sup>4</sup> the highest annual population growth rates in the Pacific are found in the Northern Mariana Islands (3.1%) and Vanuatu (2.7%). The highest total fertility rates are seen in the Marshall Islands (5.7) and Tokelau (4.9), while the lowest are in the Northern Mariana Islands (1.6), New Caledonia (2.4), and French Polynesia (2.4).

The Infant mortality rate ranges from 5 per 1000 live births in Northern Mariana Islands to 66 per 1000 in Solomon Islands. The prevalence of HIV/AIDS is still relatively low in most

<sup>4</sup> Secretariat of the Pacific Community, Pacific Island Populations 2004. [www.spc.int](http://www.spc.int).



Table 2-1: Population of Pacific Island countries and territories, 2004

Region	Country or Territory	Last Census Year	Population at Last Census	Midyear Population Estimate, 2004	Land Area (km <sup>2</sup> )	Pop. Density (people/km <sup>2</sup> )
MICRONESIA	Federated States of Micronesia	2000	107 008	112 700	701	161
	Guam	2000	156 805	166 100	541	307
	Kiribati	2000	84 494	93 100	811	115
	Marshall Islands	1999	50 840	55 400	181	306
	Nauru	2002	10 065	10 100	21	481
	Northern Mariana Islands	2000	6 221	7 8000	471	166
	Palau	2000	19 129	20 700	488	42
Micronesia				536 100	3214	167
POLYNESIA	American Samoa	2000	57 291	62 600	200	313
	Cook Islands	2001	18 027*	14 000	237	59
	French Polynesia	2002	244 830	250 500	3521	71
	Niue	2001	1788	1600	259	6
	Pitcairn Islands		52		39	
	Samoa	2001	176 710	182 700	2935	62
	Tokelau	2001	1537	1500	12	125
	Tonga	1996	97 784	98 300	650	151
	Tuvalu	2002	9561	9 600	26	389
	Wallis and Futuna	2001	14 944	14 900	142	105
Polynesia				635 700	8021	79
MELANESIA	Fiji Islands	1996	775 077	836 000	18 272	46
	New Caledonia	1996	196 836	236 900	18 576	13
	Papua New Guinea	2000	5 190 786	5 695 300	462 840	12
	Solomon Islands	1999	40 042	460 100	28370	16
	Vanuatu	1999	186 678	215 800	12 190	18
	Melanesia			7 444 100	540 248	14
TOTAL				8 615 900	551 483	16

\*Only 14 990 of the population of Cook Islands in the census reported being permanent residents.

Sources: Secretariat of the Pacific Community, Pacific Island Population 2004 ([www.spc.int](http://www.spc.int)).

of the Pacific. Other health information for each country is given in Part 2 of this book. The morbidity pattern in most of the Pacific countries has shifted significantly over the past three decades. Although infectious and parasitic diseases continue to be among the leading causes of admission to hospitals, non-communicable diseases and injuries

related to modernization and lifestyle changes are becoming more frequent.

There are two other important vector-borne diseases in the Pacific in addition to filariasis: dengue fever and malaria. Dengue is an increasing problem in most Pacific countries, while malaria is restricted to Papua New Guinea, Solomon Islands, and Vanuatu (Table 2-2).

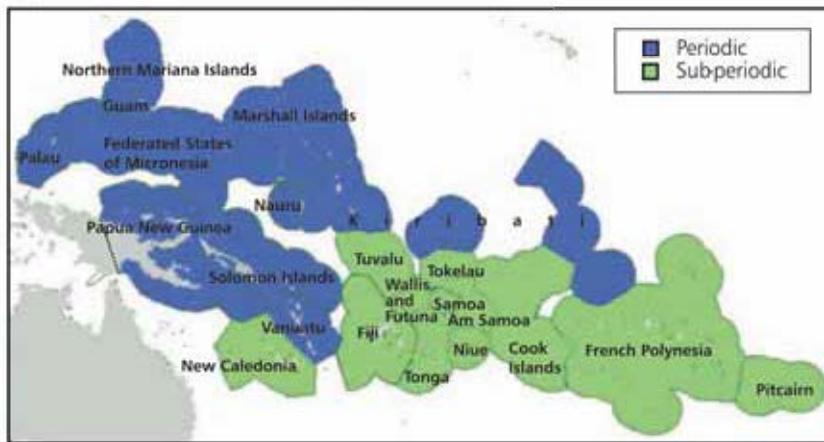
**Table 2-2.** Countries at risk for Malaria and countries that actually had dengue outbreaks in the last 10 years in the Pacific

Region	Country or Territory	Malaria	Dengue
MICRONESIA	Federated States of Micronesia		+
	Guam		+
	Kiribati		
	Marshall Islands		
	Nauru		
	Northern Mariana Islands		+
	Palau		+
POLYNESIA	American Samoa		+
	Cook Islands		+
	French Polynesia		+
	Niue		
	Pitcairn Islands		
	Samoa		+
	Tokelau		
	Tonga		+
	Tuvalu		
	Wallis and Futuna		+
MELANESIA	Fiji Islands		+
	New Caledonia		+
	Papua New Guinea	+	
	Solomon Islands	+	+
	Vanuatu	+	+



## FILARIASIS EPIDEMIOLOGY IN THE PACIFIC

Figure 2-3: Distribution of filariasis type in the Pacific



Source: SPC; PacELF; M. Sasa (1976)

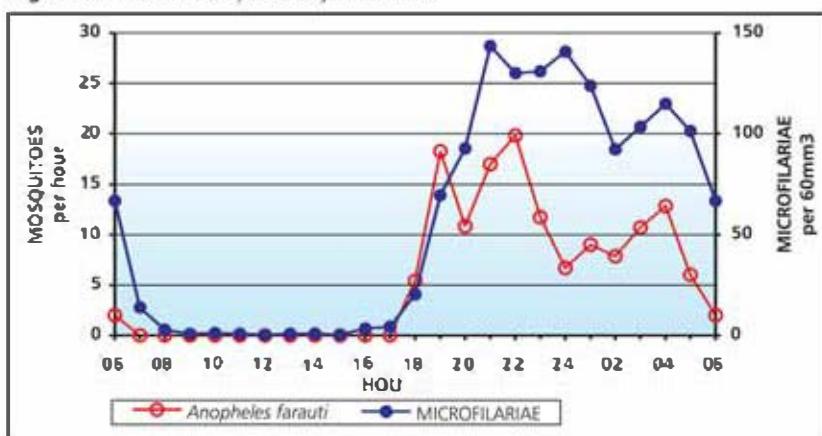
### TYPES OF FILARIASIS

The only species of filariasis present in the Pacific Islands is *Wuchereria bancrofti*. However, at least two physiological types of *W. bancrofti* exist in the Pacific: nocturnally periodic and diurnally sub-periodic types (Figure 2-3). They differ in the time of day when Mf are present in the peripheral blood and can thus be ingested by mosquitoes.

The typical fluctuation of Mf numbers in the blood (per  $\mu\text{l}$ ), as well as the mosquito densities (bites per person per hour), in two Pacific countries is shown in Figures 2-4 and 2-5. Vanuatu has nocturnally periodic filariasis (Figure 2-4). Microfilariae and mosquito density are high during the night and almost non-existent during the day. The data from Samoa (Figure 2-5) show a daily fluctuation in Mf and mosquito density, but no extended period of time when Mf density is zero.

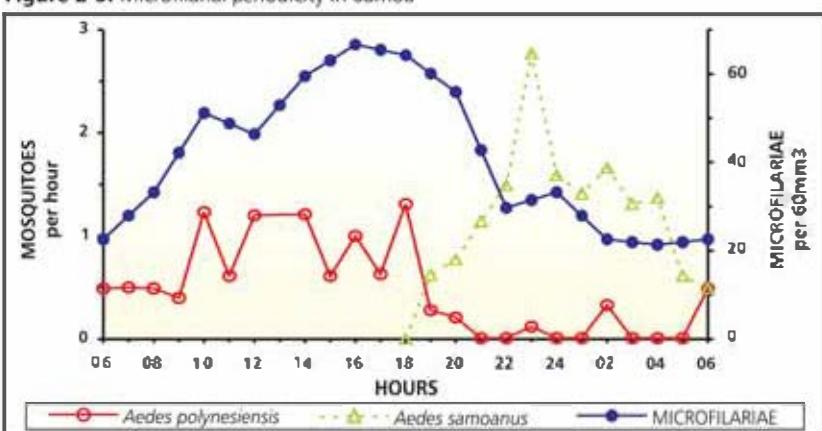
Table 2-3 lists the types of *W. bancrofti* in Micronesia, Melanesia, and Polynesia, and the main mosquitoes that serve as intermediate hosts. It

Figure 2-4: Microfilarial periodicity in Vanuatu



Source: Reproduced from Abe et al (2003), with permission

Figure 2-5: Microfilarial periodicity in Samoa



Source: Reproduced from Ramalingam et al (1968), with permission

**Table 2-3: Filariasis Transmission Type and Main Mosquito Vectors in Each Pacific Country**

Country/ territory *	<i>W.bancrofti</i> Type	Main Vectors	Region
Federated States of Micronesia	Nocturnally periodic	<i>Culex quinquefasciatus</i>	Micronesia
Guam			
Kiribati			
Marshall Islands			
Nauru			
Northern Marianas			
Palau			
Papua New Guinea		<i>Anopheles (punctulatus group)</i>	
Solomon Islands		Melanesia	
Vanuatu			
New Caledonia	Diurnally sub-periodic	<i>Aedes vigilax</i>	Oceania
Fiji			
American Samoa			
Cook Islands			
French Polynesia			
Niue			
Samoa			
Tonga			
Tokelau			
Tuvalu			
Wallis and Futuna			

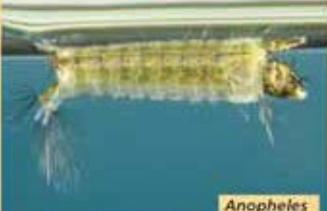
**Figure 2-6**



Source: CDC, www.cdc.gov



Source: Stephen Doggett, Department of Medical Entomology, Westmead Hospital, Sydney, Australia



Source: Stephen Doggett, Department of Medical Entomology, Westmead Hospital, Sydney, Australia

**Aedes, Culex, and Anopheles Larvae in the Pacific**

\*Pitcairn Islands not included for lack of information

shows the known areas of periodic and sub-periodic types of filariasis.

## MOSQUITO VECTORS

*Aedes*, *Culex*, and *Anopheles* are the three main mosquitoes involved in lymphatic filariasis transmission in the Pacific (Figures 2-6 and 2-7). In most of Micronesia, filariasis is nocturnally periodic and transmitted by *Cx. quinquefasciatus*, whereas nocturnally

periodic *W. bancrofti* in Melanesia is transmitted mainly by species in the *Anopheles punctulatus* group. In the sub-periodic areas, some *Aedes* species in the *scutellaris* group transmit the parasite during the day. *Aedes vigilax* is the major vector in New Caledonia, and may transmit filariasis at night or during the day. The geographical distribution of these vectors is shown in Figure 2-8.

**Figure 2-7** Aedes, Culex, and Anopheles Adults in the Pacific



Source: © McCormick, Cook Islands Natural Heritage Project

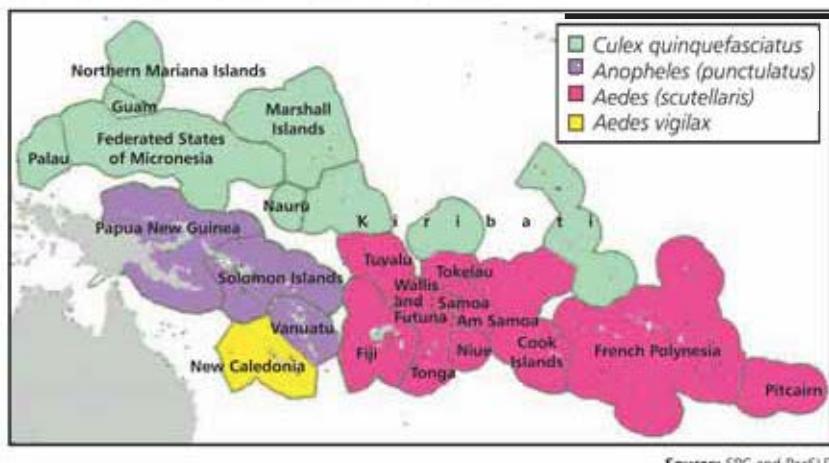


Source: CDC, www.cdc.gov



Source: Stephen Doggett, Department of Medical Entomology, Westmead Hospital, Sydney, Australia



**Figure 2-8: Mosquito vector distribution in the Pacific**

## HISTORY OF FILARIASIS BEFORE PacELF

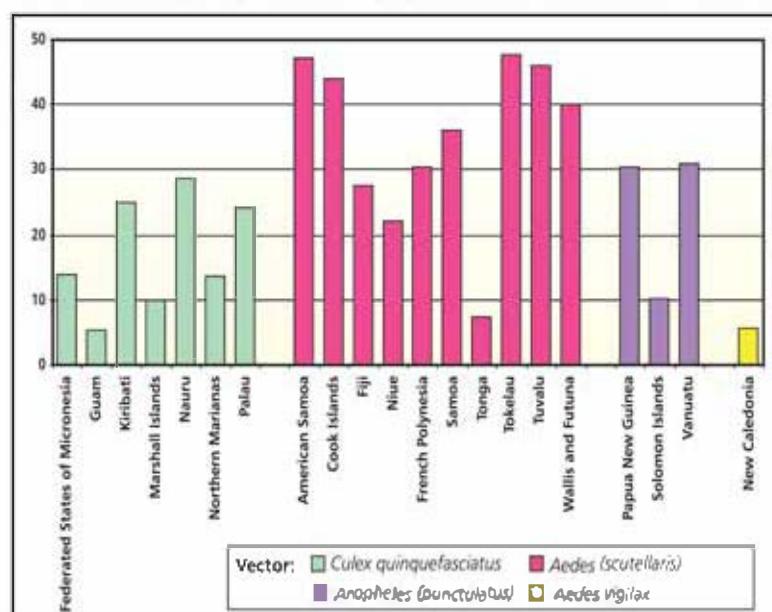
Filariasis has been a scourge in the Pacific for centuries. *Waqaga, big leg, aoraki man te mata, rektel a rekas, mumu lulupa mwirara, filariasis pwuur, moko pata, kinal, te fu'aa, va'e fua, eke'eke, filarose, fe'ee, and legi b.kiare* are all common words in the Pacific languages that are used to describe lymphatic filariasis.

While travelling across the Pacific, Captain James Cook made the first notes on elephantiasis in Tonga in 1785. Microfilariae were first discovered in the Pacific as early as 1896, when Thorpe and Manson both observed Mf in blood films in Fiji, Tonga, and Samoa. Also in 1896, Manson described Samoans suffering from an "elephantoid" disease.

The prevalence of filariasis and elephantiasis in the Pacific region used to be among the highest documented in the world. Figure 2-9 shows the prevalence of the disease as reported in studies done before 1950.

## FILARIASIS CONTROL PROGRAMMES

Efforts to control filariasis have a long history in the Pacific, in particular, some countries including American Samoa, Fiji, French Polynesia, Papua

**Figure 2-9: Percentage of people infected (Mf positive) in the PacELF countries before 1950**

Source: Sasa (1976)

New Guinea, and Samoa have carried out quite extensive MDA programmes with DEC. Details of the MDA programmes in each country are summarized below, and described in more detail in Part 2 of this book.

The first attempts at mass control in the Pacific began in Fiji in 1944 and focused entirely on vector control—either the elimination of mosquito breeding sites through mass clean-up campaigns

Figure 2-10



Elephantiasis of the legs in a group of men in Fiji, date unknown.

Source: Fiji Ministry of Health

or the use of insecticides like dichlorodiphenyltrichloroethane (DDT). This vector control strategy was also tried in the Cook Islands and then in Samoa and Tahiti. Malaria control through indoor residual spraying with DDT in Melanesian countries during the 1960s and 1970s appears to have reduced or even eliminated filariasis in some areas.

Many drugs, including anilomials, arsenoxides, cyanine dyes, and piperazine derivatives, were used to

### American Samoa

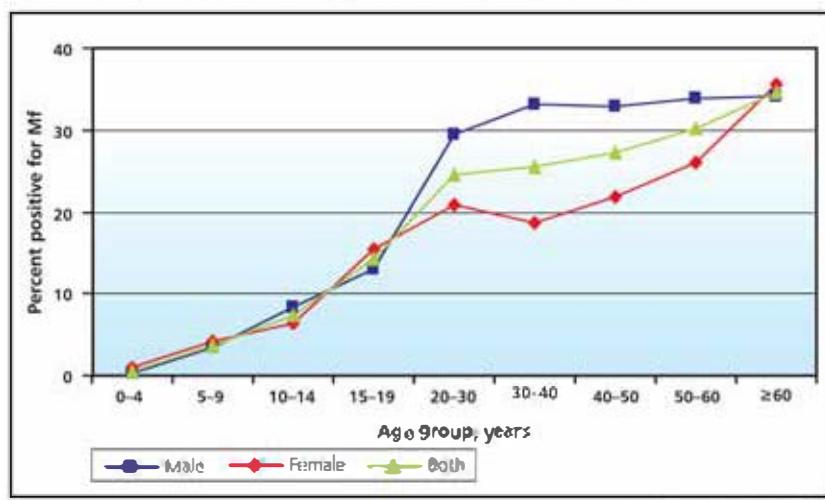
The high prevalence and frequency of elephantiasis in American Samoa prompted control attempts in the 1960s. Two MDAs were carried out nationwide in 1963 and 1965 with 72 mg of DEC given per kilogram of body weight. A post-treatment survey in 1970–1972 found that the Mf rate had dropped from 21% to 0.9% on Tutuila island,<sup>5</sup> elephantiasis to less than 1%, and hydrocoele to 2.1%. However, Mf prevalence rates increased again in the 1980s and 1990s.

### Fiji

Fiji has long been notorious for its high prevalence of filariasis and elephantiasis (Figure 2-10). The first full-scale trial of MDA was carried out in Fiji between 1952 and 1953. Then in Northern Fiji in the 1960s, a pilot project was carried out on the islands of Vanua Levu, Taveuni, and Koro.<sup>6</sup> In a pre-intervention survey, the prevalence of Mf was found to be 13% among females and 17% among males, for an average prevalence rate of 15% (Fig 2-11). The geometric mean number of Mf ranged from 2 to 14 per 20 µl in males, and from 1 to 5.5 in females, depending on the location. Prevalence rates and Mf densities in southern coastal and island locations were two to three times higher than in inland areas, apparently because of the higher rainfall on the southern coast of islands and the presence of *Ae. polynesiensis* within 0.8 km of the coast.

The prevalence rates, but not the Mf densities, were lower among persons of Indian descent living in the same geographical situations as Fijians with higher infection rates. The prevalence among Indians averaged 8% in both males and females. However, the prevalence of elephantiasis in the same areas was no different between Fijians and Indians.<sup>7</sup>

Figure 2-11: Age-specific prevalence of Mf in Northern Fiji, 1968–1969



Source: Mataika et al (1971)

treat filariasis, with little success, until the introduction of DEC in 1947. In the 1950s to the 1960s, many pioneering anti-filarial trials using the recently discovered DEC were conducted in the Pacific Islands. Mass DEC treatment was implemented on a large scale in American Samoa, Fiji, French Polynesia, Samoa, and Wallis and Futuna, and on a more limited scale in Cook Islands, Niue, Palau, Tokelau, Tonga, and Tuvalu. However, programmes rarely achieved a high compliance rate over large areas for sustained periods, and filariasis remained endemic in many Pacific Island countries.

<sup>5</sup> WHO/SPC (1974)

<sup>6</sup> Mataika et al (1971)

<sup>7</sup> Mataika et al. (1971)



The pilot MDA in northern Fiji was followed by a national DEC programme from 1969 to 1975. The dose was 5 mg/kg given weekly for six weeks and then monthly for 22 months, for a total of 140 mg/kg given in 28 doses over a two-year period.<sup>3</sup> The Mf prevalence fell to less than 1% after the MDA, but by 1983 the Mf rate was increasing again in almost all areas.

Between 1984 and 1991 a trial project comparing a multiple-dose regimen of DEC with different annual single-dose regimes was carried out in three areas of Fiji. It showed that a single dose of 6 mg/kg annually for five years was almost as effective as the full course of 28 doses given over a period of 12 to 18 months.<sup>4</sup> The single-dose regime was much simpler to administer and was likely to achieve higher coverage.

Mataika<sup>5</sup> tried out mass single-dose annual drug administration in 43 villages on Kadavu island, southern Fiji, in the late 1980s and early 1990s. In 1985, a survey of 76.3% of the population ( $n=5799$ ) showed the prevalence of Mf in 60 µl blood to be 6.9%, although it varied by village from 0.4% to 28.8%. Microfilaria density varied from a geometric mean of 1 to 67.6 by village.

The Mf prevalence in Kadavu declined from 6.9% ( $n=4686$ ) in 1985 to a low of 0.7% ( $n=2611$ ) in 1990–1991 (Figure 2-12) after five single annual doses of DEC. However, the coverage rate with DEC is not stated, and the number of people surveyed in the last year of the programme was only about 60% of the number surveyed in 1985, suggesting that compliance had declined significantly. Although the MDA was island-wide, 11 of the villages had small populations and poor compliance, and were not included in the results shown in Figure 2-12. On the other hand, it was noted in these studies that

the rate of decline of Mf prevalence in villages with high initial Mf densities was similar to that seen in villages with low Mf density.

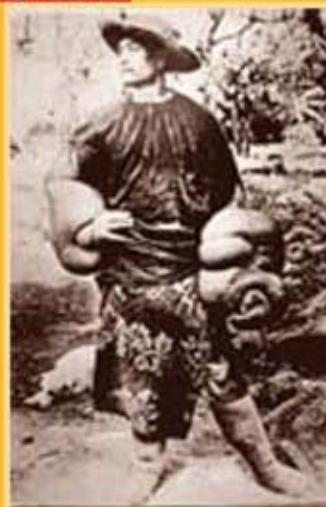
Despite these encouraging results on one island, wider surveys carried out in Fiji between 1991 and 1995 determined the overall prevalence of Mf to be 5.1%. No further MDAs were carried out in Fiji until the start of PacELF.

### French Polynesia

In the early 20th century, the prevalence of Mf in French Polynesia was thought to be around 40%, with peaks of up to 80% in certain areas. The Institut Louis Malardé in Tahiti was in fact created in 1949 (under the name Institut de Recherches Médicales des Etablissements Français de l'Océanie) mainly to fight lymphatic filariasis in the French territories (Figure 2-13).

French Polynesia has a long history of MDA programmes, starting in 1949–1952, when various DEC regimes were tried. A mass drug administration was then done in rural Tahiti in 1953, followed by the treatment of positive carriers identified in regular surveys until

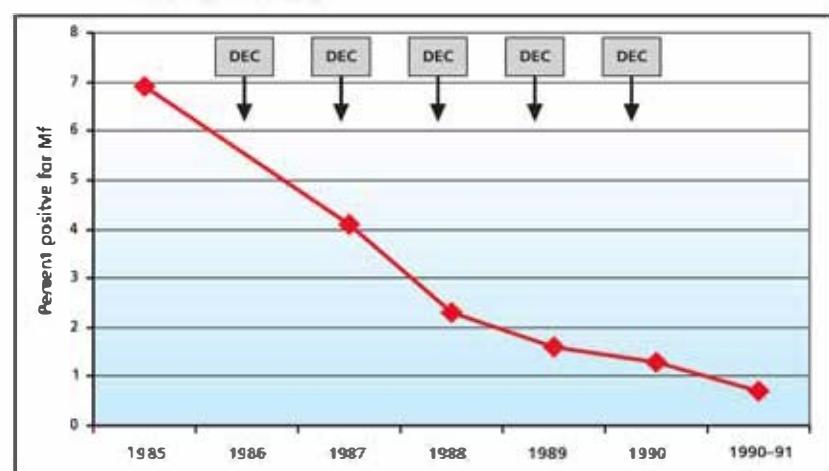
Figure 2-13



Elephantiasis of the arms in historical postcard from French Polynesia, date unknown.

Source: Institut Louis Malardé, www.lm.pf

Figure 2-12: Decline in Mf prevalence on Kadavu island, Fiji, during and after five rounds of DEC in 1987–1991



Source: Mataika et al (1998)

<sup>3</sup> WHO/SPC (1974)

<sup>4</sup> Gemba and Mataika (1996)

<sup>5</sup> Mataika et al (1998)



1964.<sup>11</sup> The prevalence of Mf declined from 30% to 21% in 1953, and then dropped sharply to 6% in 1955. It plateaued at this level until 1964, despite repeated treatments of Mf carriers with DEC. Elephantiasis similarly declined from 7% in 1949 to 2% in 1958 and 1964.<sup>12</sup> The MI prevalence in Tahiti further declined to 2% after a series of four annual doses of DEC from 1974 to 1977.<sup>13</sup>

DEC distribution, through MDA or limited drug distribution in the vicinity of known carriers, continued in Tahiti, Mourea, and Maupihi during the 1980s. Mass treatment continued in Maupihi until 1997 (by which time treatment had gone on for 34 years), but residual microfilaraemia of 0.4% in people on the island in 1997.<sup>14</sup>

### Papua New Guinea

Papua New Guinea has extremely high Mf prevalence rates in some areas, such as the East Sepik region. It has also been the site of extensive research and trials of treatment for filariasis. The age-specific prevalence of Mf, leg oedema, and hydrocoele is shown in Figure 2-14. Overall, the prevalence of Mf in this area was 66%. In contrast to Samoa and Fiji, no difference was found in prevalence rates between men and women in the area.

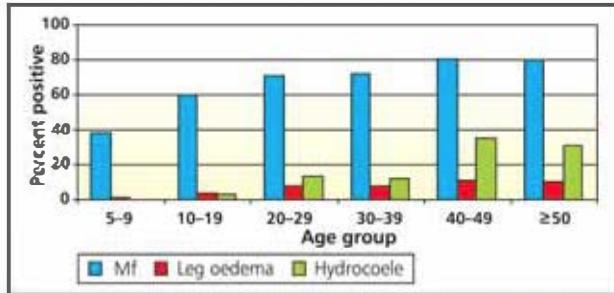
A trial comparing four annual single doses of DEC plus ivermectin with DEC alone in the East Sepik province in 1994 to 1997 reduced the MI prevalence by 86% to 98%, and greatly reduced transmission and the prevalence of hydrocoele and lymphoedema.<sup>14</sup> A trial comparing DEC salt with tablets was done in the 1990s.<sup>15</sup>

Mining companies have supported several MDA programmes in the regions around the mines, starting with DEC in the Ok Tedi mine area in the 1980s. In the Samarai district (site of the Misima mine), a community-delivered MDA programme with DEC and albendazole, was very successful in reducing the antigen prevalence from its initial high level of 63% to 6.6% in 2003.<sup>16</sup> There was circumstantial evidence that the MDA programme also had beneficial effects on childhood growth and birth weight in the area, perhaps because of the effect of MDA on other worm infections.

### Samoa

Eight MDAs with DEC were completed in Samoa between 1962 and the start of PacELF, and two more with DEC and ivermectin were completed in 1996 and 1997. The first MDA with DEC in 1962 used 5 mg/kg once a week for four weeks, then once a month for 18

Figure 2-14: Age-specific prevalence in Drekikir area, Papua New Guinea, 1993–1994



Source: Kazura et al (1997)

<sup>11</sup> Laigret et al (1966)

<sup>12</sup> Laigret et al (1980)

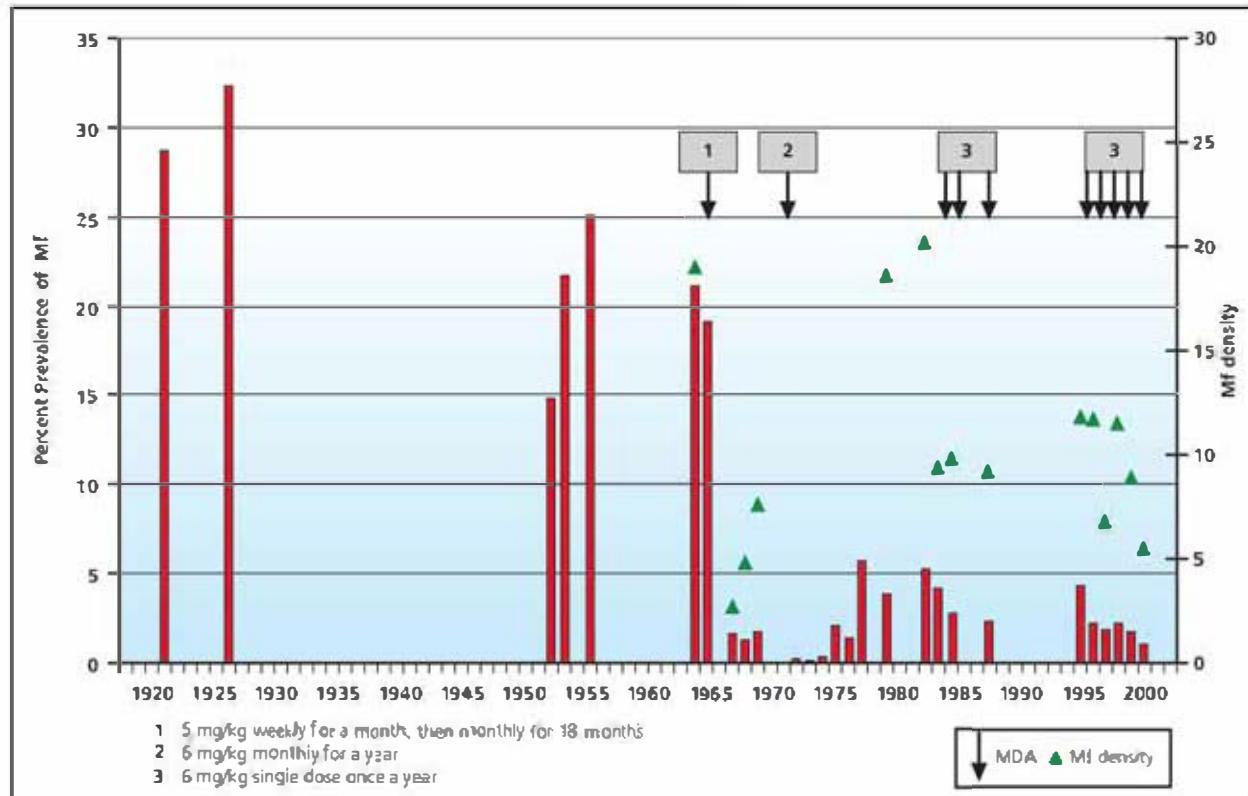
<sup>13</sup> Esner et al (2001)

<sup>14</sup> Bockarie et al (2002)

<sup>15</sup> Sapak (1998)

<sup>16</sup> Sapak et al (2004), [www.jcu.edu.au](http://www.jcu.edu.au)

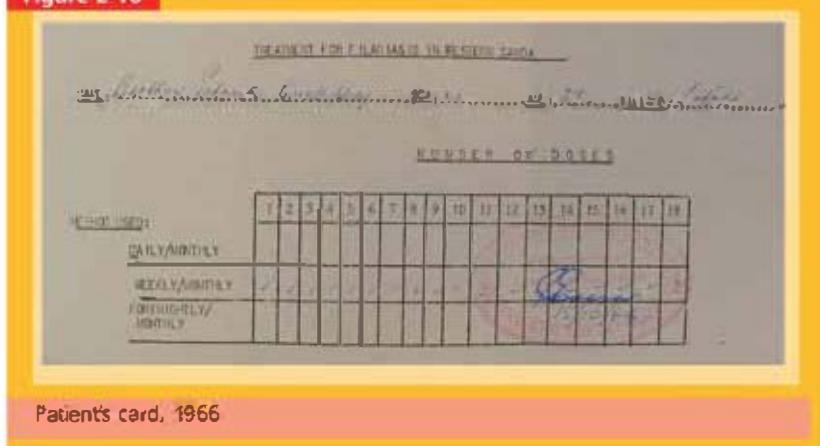


**Figure 2-15:** Mf prevalence, Mf density, and MDA timing in Samoa before PacELF

months; it led to a dramatic reduction in the Mf prevalence (Figure 2-15). A further MDA in 1966–1967 using 6 mg/kg once a month for 12 months lowered the Mf rate to 1.6% in 1972. After these campaigns, Mf rates remained low, but they have never reached 0%, and in a survey of more than 10 000 people in 1982, rates were over 5%. Subsequent MDAs in the 1980s with annual single doses of 6 mg/kg helped to keep the Mf prevalence below 5%, but the Mf density remained quite high.

A patient's card for the 18-dose regimen from 1966 is shown in Figure 2-16. It indicates that he took all the recommended doses. Pages from Samoa registration books for 1971 (with the 12-dose regimen) and 1982 (single annual dose) are shown in Figures 2-17 and 2-18.

It was not until the 1990s that Samoa conducted a continuous five-

**Figure 2-16**

year sustained MDA programme, first with DEC alone in a single annual dose for three years (1993–1995) and then with DEC and ivermectin for two years (1996–1997). The MDAs during the 1990s paid close attention to maintaining high coverage, resulting in a sustained drop in prevalence over that

**Figure 2-17**

Page from Samoa registration book, 1971

**Figure 2-18**

SOON	T	M.G.P.O.	SOON	T	M.G.P.O.
1. <i>Leptothrix</i>	X	T	14. <i>Lamia</i>	X	T
2. <i>Leucotricha</i>	X	T	15. <i>Spiralis</i>	X	T
3. <i>Leucosticha</i>	X	T	16. <i>Strobila</i>	X	T
4. <i>Leucotricha</i>	X	T	17. <i>Thrinax</i>	X	T
5. <i>Leucotricha</i>	X	T	18. <i>Trichia</i>	X	T
6. <i>Leucotricha</i>	X	T	19. <i>Trichia</i>	X	T
7. <i>Leucotricha</i>	X	T	20. <i>Trichia</i>	X	T
8. <i>Leucotricha</i>	X	T	21. <i>Trichia</i>	X	T
9. <i>Leucotricha</i>	X	T	22. <i>Trichia</i>	X	T
10. <i>Leucotricha</i>	X	T	23. <i>Trichia</i>	X	T
11. <i>Leucotricha</i>	X	T	24. <i>Trichia</i>	X	T
12. <i>Leucotricha</i>	X	T	25. <i>Trichia</i>	X	T
13. <i>Leucotricha</i>	X	T	26. <i>Trichia</i>	X	T
14. <i>Leucotricha</i>	X	T	27. <i>Trichia</i>	X	T
15. <i>Leucotricha</i>	X	T	28. <i>Trichia</i>	X	T
16. <i>Leucotricha</i>	X	T	29. <i>Trichia</i>	X	T
17. <i>Leucotricha</i>	X	T	30. <i>Trichia</i>	X	T
18. <i>Leucotricha</i>	X	T	31. <i>Trichia</i>	X	T
19. <i>Leucotricha</i>	X	T	32. <i>Trichia</i>	X	T
20. <i>Leucotricha</i>	X	T	33. <i>Trichia</i>	X	T
21. <i>Leucotricha</i>	X	T	34. <i>Trichia</i>	X	T
22. <i>Leucotricha</i>	X	T	35. <i>Trichia</i>	X	T
23. <i>Leucotricha</i>	X	T	36. <i>Trichia</i>	X	T
24. <i>Leucotricha</i>	X	T	37. <i>Trichia</i>	X	T
25. <i>Leucotricha</i>	X	T	38. <i>Trichia</i>	X	T
26. <i>Leucotricha</i>	X	T	39. <i>Trichia</i>	X	T
27. <i>Leucotricha</i>	X	T	40. <i>Trichia</i>	X	T
28. <i>Leucotricha</i>	X	T	41. <i>Trichia</i>	X	T
29. <i>Leucotricha</i>	X	T	42. <i>Trichia</i>	X	T
30. <i>Leucotricha</i>	X	T	43. <i>Trichia</i>	X	T

Page from Samoa registration book, 1982

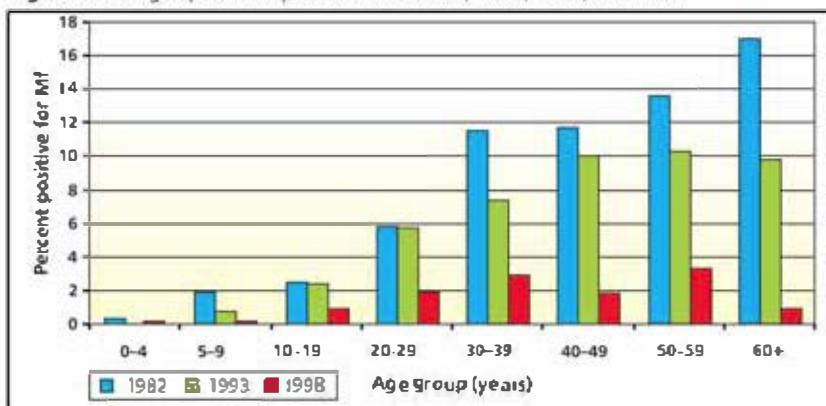
**Table 2-4: MDA coverage, MF prevalence, and MF density in Samoa, 1993-1998**

Item	1993	1994	1995	1996	1997	1998
Drug used	DEC	DEC	DEC	DEC+ ivermectin	DEC+ ivermectin	
MDA coverage (%)	83.3	67.2	80.1	79.4	91.6	Not done
Number of villages	32	30	23	31	29	
Number examined	10 256	10 112	4551	5997	8305	4054
Number positive	444	225	86	133	141	43
Mf rate (%)						
Males	7.5	3.9	4.2	4.1	3.4	1.7
Females	2.0	1.0	0.6	1.2	0.5	0.4
Total	4.7	2.4	2.4	2.6	1.9	1.1
Mf density (geometric mean per 60 µl)						
Males	13.5	12.1	6.6	12.6	9.1	5.4
Females	8.0	10.5	8.2	9.4	8.1	5.8
Total	11.8	11.7	6.8	11.5	8.9	5.5

period (Table 2-4). However there was no marked reduction in Mf density in the remaining positive cases (Table 2-4).

As a result of the many MDAs, the age-specific Mf prevalence curve in Samoa changed dramatically from 1982 to 1998, with the greatest decline in prevalence being seen among older age groups (Figure 2-19). In 1998, the Mf prevalence in Samoa was estimated at 1.1% overall (1.7% in males and 0.4% in females). In 1999, the country was the first to start MDA with DEC and albendazole under PacELF.

**Figure 2-19:** Age-specific Mf prevalence in Samoa, 1982, 1993, and 1998



<b>Other countries</b>	0.3% in 1000 persons examined in 1972. <sup>18</sup>
<b>Cook Islands.</b> An MDA campaign on Aitutaki in 1968 reduced the Mf rates to 0.8% in 1969 and 0.2% in 1971. <sup>17</sup> However, a survey of the island in 1992 showed that Mf rates had increased to 3.2%.	<b>Tokelau.</b> An MDA was implemented throughout the territory in 1994, despite the fact that a nationwide survey at that time identified only one positive case.
<b>Federated States of Micronesia.</b> An MDA using DEC on four islands of Yap in 1974 treated 865 people.	<b>Tonga.</b> An MDA, which was started in May 1977, led to a drop in the Mf rate from 17% to 1% according to a post-treatment survey in 1979. A follow-up MDA survey from October 1983 to January 1984 in some limited areas found the rate to be 0.4%.
<b>Niue.</b> Three MDAs were done:	
(1) After an MDA in January 1956, when the Mf prevalence was 22.1%, the rate fell to 2.9% in December of that year.	<b>Tuvalu.</b> An MDA using DEC in 1972 lowered the Mf prevalence rate from 14.7% in 1971 to just below 1% in 1973, according to the post-treatment survey that year. An MDA using DEC was also implemented in 1992–1993.
(2) MDA with DEC in 1972 was thought to have eliminated the disease. However, a survey in 1996 found an Mf rate of 1.8%.	
(3) Another MDA was carried out in 1997 using a combination of ivermectin (200 µg/kg) and DEC (6 mg/kg).	<b>Wallis and Futuna.</b> Monthly DEC distribution began in 1978 and continued until 1987. Mf rates dropped from 5.3% in 1978 to 3.2% in 1985 in Wallis, and from 1.7% in 1978 to 0.4% in 1985 in Futuna. The distribution programme became biannual in 1987 and stayed that way until 2002.
<b>Palau.</b> An MDA with DEC at a dosage of 5 mg/kg every other month for two years was carried out in the early 1970s. This lowered the Mf rate from 12.6% to	

## THE PacELF INITIATIVE

### BIRTH OF PacELF

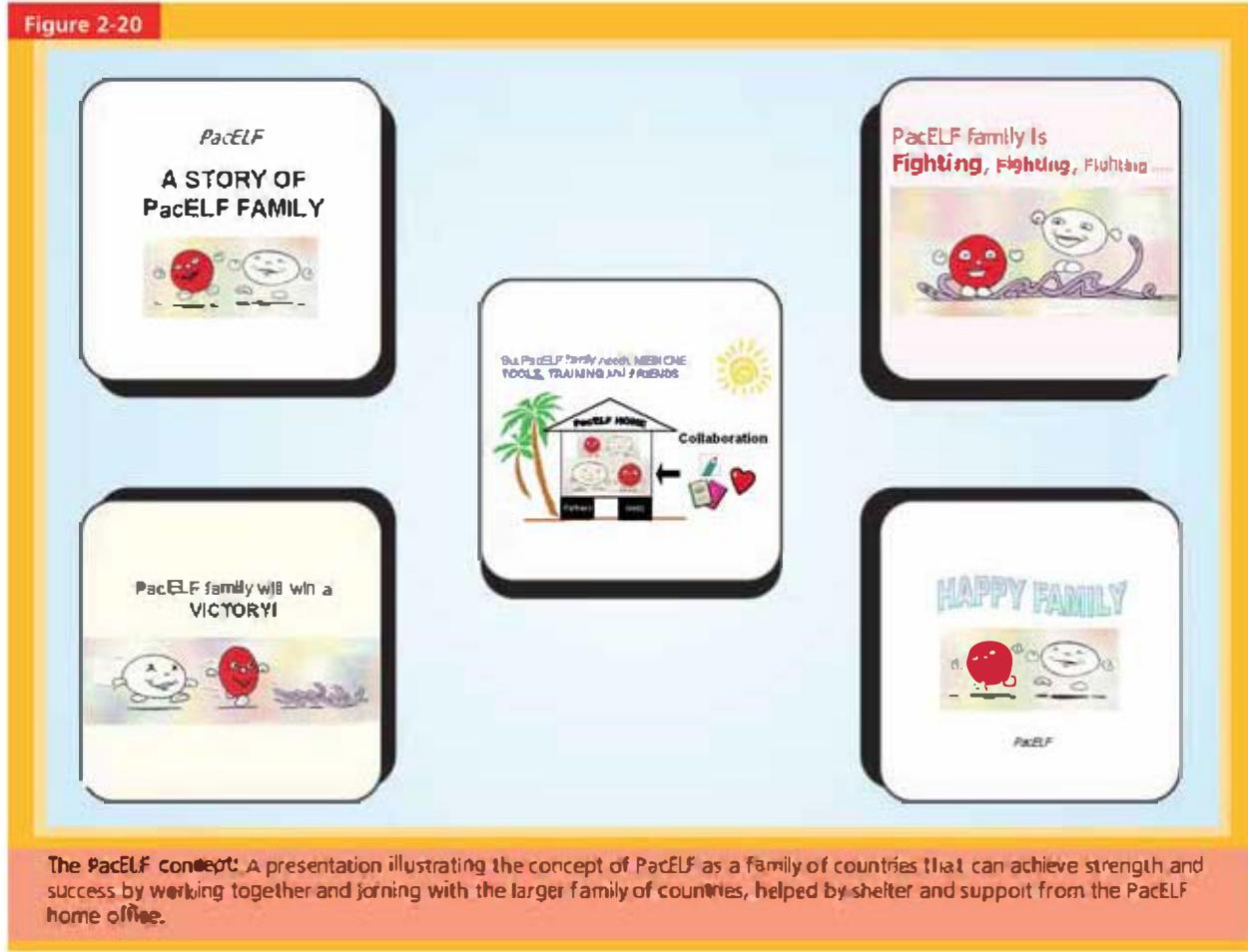
In March 1999, in back-to-back meetings in Palau, the WHO Western Pacific Regional Office and the Secretariat of the Pacific Community (SPC) took up a call to action set by the World Health Assembly resolution on eliminating lymphatic filariasis. The meetings encouraged SPC to continue discussions with WHO and other donor agencies on a comprehensive strategy

for eliminating lymphatic filariasis in all 22 island countries and territories in the Pacific. The WHO Regional Director was asked to consider making the elimination of filariasis a WHO priority. The meetings also increased awareness of filariasis as a public health problem and alerted Pacific Island communities to the need to control and eventually eliminate the disease.

<sup>17</sup> WHO/SPC report (1974).

<sup>18</sup> WHO/SPC report (1974).

Figure 2-20



At this time, both WHO and SPC were well positioned to work together on lymphatic filariasis control. WHO had experts in vector-borne and communicable diseases in Manila, Papua New Guinea, Solomon Islands, and Vanuatu. The SPC, on the other hand, was implementing the Pacific Regional Vector Borne Diseases Project, funded by the Australian Agency for International Development (AusAID), and had staff based at SPC headquarters in Nouméa and at project offices in Vanuatu, Solomon Islands, and Fiji.

Dr Kazuyoshi Tchimori of WHO and Dr Tony Stewart of SPC met in Port Vila, Vanuatu on 11 April 1999 to discuss how best to carry out the resolutions of

the World Health Assembly and the Regional meetings. They envisioned a regional programme driven by the countries themselves, and coined the name PacELF—the Pacific Programme for the Elimination of Lymphatic Filariasis (Figure 2-20). They secured funding from WHO and through the AusAID/SPC vector-borne diseases project for a meeting of Pacific country representatives. This took place in Brisbane on 28 and 29 June 1999.

Public health officials from Pacific countries,<sup>19</sup> plus staff of other institutions in filariasis elimination,<sup>20</sup> attended the meeting and discussed activities being carried out or planned worldwide and in the Pacific. The country representatives refined and endorsed the regional plan

<sup>19</sup> American Samoa, Cook Islands, Fiji, French Polynesia, Nauru, New Caledonia, Niue, Papua New Guinea, Samoa, Solomon Islands, Tonga, Tuvalu, Vanuatu, and Wallis and Futuna.

<sup>20</sup> University of Queensland, Australia; James Cook University, Australia; SmithKline Beecham (now GlaxoSmithKline); and AMRAD ICF.



of action, and named four country representatives to an interim body that would coordinate implementation between meetings. This meeting gave birth to PacELF, the first regional programme with the goal of eliminating lymphatic filariasis. In June 1999 PacELF already had an action plan and was looking forward to eliminating the disease in the Pacific by 2010. Table 2-5 lists important events in the history of PacELF.

**Table 2-5:** PacELF chronology, 1999–2005

Date	Activity	Place
17–19 Mar 1999	Resolution endorsed at meeting of Pacific health ministers	Palau
28–29 Jun 1999	1st annual PacELF meeting (birth of PacELF)	Brisbane, Australia
Oct 1999	1st MDA in PacELF implemented in Samoa	Samoa
1 Dec 1999	1st CB meeting	Suva, Fiji
2 Dec 1999	Mataika House opened	Suva, Fiji
20 Apr 2000	SPC/PacELF meeting	Suva, Fiji
Apr 2000	JICA collaboration started	Suva, Fiji
22–23 Jun 2000	2nd CB meeting	Nouméa, New Caledonia
16–20 Oct 2000	2nd annual PacELF meeting	Brisbane, Australia
20 Oct 2000	3rd CB meeting	Brisbane, Australia
25–26 Jan 2001	1st super CB meeting	Suva, Fiji
12–15 Mar 2001	Meeting of Pacific ministers	Madang, Papua New Guinea
26–27 Mar 2001	PacELF visited by GSK team	Suva, Fiji
Jun 2001	PacELF logo developed	Suva, Fiji
8 Jul 2001	PacELF home office opened at Mataika House	Suva, Fiji
24–29 Sep 2001	3rd annual PacELF meeting	Nadi, Fiji
27 Sep 2001	1st PacCARE meeting	Nadi, Fiji
19–20 Feb 2002	2nd PacCARE meeting	Suva, Fiji
19–23 Aug 2002	4th PacELF annual meeting	Rarotonga, Cook Islands
21–22 Aug 2002	3rd PacCARE meeting	Rarotonga, Cook Islands
1 Oct 2002	PacELF website launched	Suva, Fiji
17–18 Feb 2003	4th PacCARE meeting	Suva, Fiji
22–26 Sep 2003	5th PacELF annual meeting	Lautoka, Fiji
26 Sep 2003	5th PacCARE meeting	Lautoka, Fiji
23–27 Aug 2004	6th PacELF annual meeting	Apia, Samoa
27 Aug 2004	6th PacCARE meeting	Apia, Samoa
22–26 Aug 2005	7th PacELF annual meeting	Suva, Fiji
26 Aug 2005	7th PacCARE meeting	Suva, Fiji

## ORGANIZATION AND FUNDING

PacELF (see organization chart in Figure 2-21) is an alliance of 22 Pacific Island countries and territories, which have joined together to help one another eliminate filariasis. It is the Pacific regional counterpart of the Global Alliance to Eliminate Lymphatic Filariasis, supported by WHO. PacELF is a support network for the Pacific countries and a channel for information exchange between the Pacific communities and outside partners.

WHO, through its South Pacific office in Suva, Fiji, is the backbone of support for PacELF. The PacELF home office was established in 2001 at Mataika House (National Centre for Scientific Services on Virology and Vector Borne Diseases, now called the Fiji Centre for Communicable Disease Control) in Suva (Figure 2-22). PacELF facilitates regional efforts to eliminate filariasis and negotiates with donors to help coordinate their activities. It maximizes the use of resources by coordinating procurement, shipping, and storage of supplies. PacELF also serves as a source of technical advice to countries on mass drug administration, health promotional materials, surveillance, and data management.

The PacELF team, headed by a full-time WHO Scientist, started with only one volunteer staff member supported by the Japanese Government through the Japanese Overseas Cooperation Volunteer (JOCV) programme. The staff has since grown to include full-time coordinators in Fiji (started in 2003), Samoa (2003), and most recently Papua New Guinea (2005), all supported by WHO. The number of volunteer staff from JOCV and the United Nations Volunteer (UNV) programme working in the PacELF office now stands at three, and a Peace Corps volunteer will join the programme in 2005. Individual country programmes in Fiji, Samoa, Tonga, and Vanuatu have also benefited from the services of JOCV or Voluntary Service Overseas (VSO) staff. In addition, the PacELF team includes representatives from the Fiji Government, WHO short-term consultants, and technical advisers from the Centers for Disease Control

Figure 2-21: PacELF organization

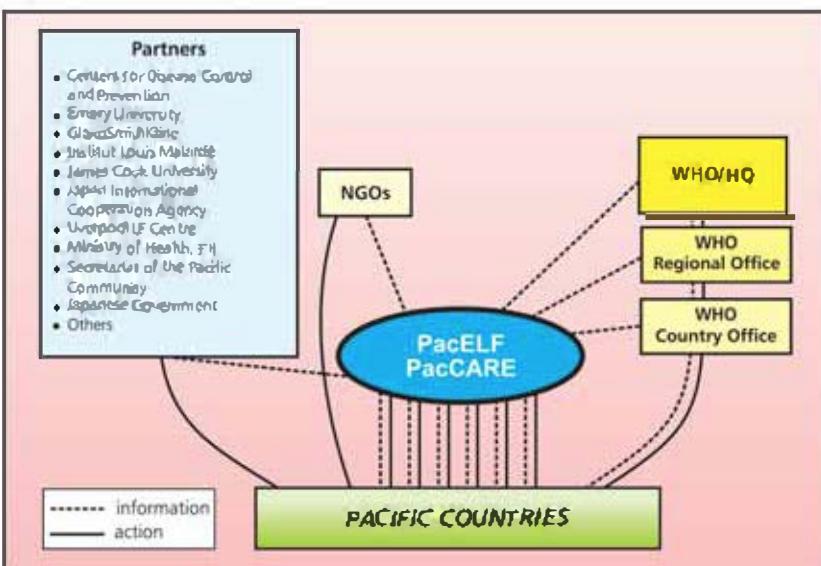


Figure 2-22



and Prevention (CDC) of the United States of America and other academic institutions.

The PacELF Coordination and Review group (PacCARE) approves annual applications and re-applications for drugs and supplies. This group started as the PacELF coordinating body but changed its name to PacCARE in 2001 to better reflect its function as an external watchdog over PacELF's applications and annual reports. The group is roughly equivalent in function to the regional programme review groups established by the other regional filariasis elimination programmes under the GPELF. It is led by representatives from Pacific ministries of health.

WHO provides major financial support for staff, local costs, meetings, supplies, and equipment. The Japanese Government and the Japan International Cooperation Agency (JICA) donate the DEC tablets, ICT cards, and some funds for the PacELF countries. Albendazole tablets are supplied free of charge by the manufacturer, GlaxoSmithKline. The CDC and Emory University provide technical support and personnel for American Samoa and other territories of the United States in the Pacific. Other donors are the Ministry of Health of Fiji and the Liverpool School of Tropical Medicine in the United Kingdom.

## POLICY, STRATEGY, AND PLAN

The goal of PacELF is to eliminate lymphatic filariasis in the Pacific region by 2010. This is 10 years ahead of the global goal of 2020. According to the PacELF definition, the disease will be considered eliminated when the parasite is no longer transmitted to humans. To meet this goal, PacELF has developed policies, chosen a strategy based on scientific evidence and the capacity of

the member countries, and drawn up a plan of action.

### PacELF policy

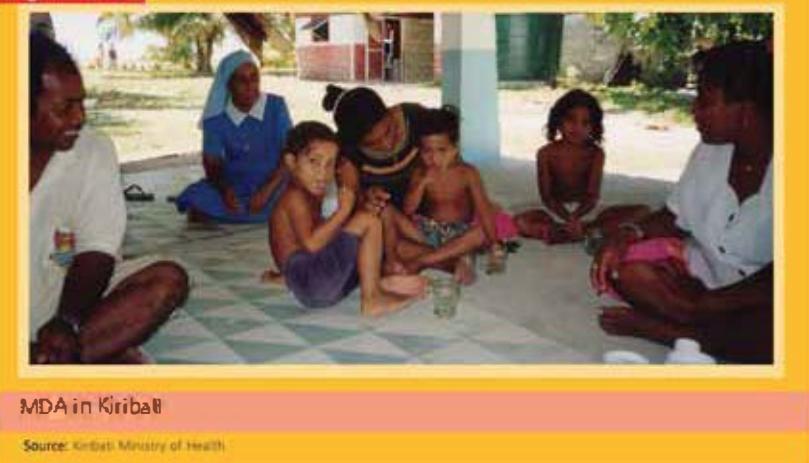
PacELF has developed policies to standardize activities in the region, keeping in mind the scientific requirements of the programme and the resource limitations and challenges in the member countries. A unique characteristic of PacELF is that each country follows these policies, yet retains the flexibility to choose the best way to implement activities.

The policies of PacELF are as follows:

- (1) The implementation unit in each country except Papua New Guinea is the whole country.
- (2) All countries will implement baseline surveys using ICT to determine endemicity.
- (3) Combination therapy of diethylcarbamazine and albendazole will be used in mass drug administration (MDA).
- (4) Countries where filariasis is endemic will conduct five rounds of MDA and then assess the impact.
- (5) Each MDA will be completed in two months.
- (6) The following categories of people will not be treated: children under 24 months, pregnant women, and very sick people (hospitalized, sick with cancer, or undergoing dialysis).
- (7) ICT will be used in midterm and final surveys to assess the impact of MDA.
- (8) Appropriate vector control methods will be used.
- (9) Filariasis control methods will be integrated where possible with other country programmes including those for malaria control, dengue control, and other helminth control.
- (10) Lymphoedema and other pathology will be clinically managed to minimize the effects of the disease.

Pregnant women are excluded only as a precaution. There is no evidence that the tablets cause harm to pregnant women or their babies. Pregnant women are advised to come back for the tablets after delivery. Individuals who have serious pre-existing health conditions such as cancer or advanced renal disease are discouraged from seeking treatment.

Figure 2-23



MDA in Kiribati

Source: Kiribati Ministry of Health

so the number of tablets needed can be estimated. Some countries also have census data available to aid estimates. Most countries organize the MDA by health facility, but some countries have demonstrated effective distribution by church members, women's committees, or other organizations. Usually the nurse or doctor in charge of a health facility estimates the population to be treated in the area and orders the required number of drugs and register books through the PacELF home office, which ships the orders to the facilities.

The tablets are distributed in village or settlement meetings, house to house, or at static booths in public areas or at large events. In all PacELF countries the names of those treated are recorded in a register to allow estimates to be made of treatment coverage and number of tablets issued. Data on each participant individual's age, sex, and village are entered in the register. If a registered individual cannot take treatment, the reason is documented on the form. The registers and leftover tablets are sent back to the country office after the campaign for that year.

The DEC tablets supplied by PacELF are 50 mg each and are given at a dose of 6 mg/kg. Albendazole tablets are 400 mg each, and one tablet is given to people of all ages (Figure 2-23). Treatment is given either by weight or by age; the choice is left to the country programme. Each country may have a slightly different breakdown of body weight categories. Calculating dosage by weight is difficult in the field, so some countries use age as an estimate of body size to determine the number of DEC tablets required. If exact age is not known, it is estimated to within the nearest age group. Treatment schedules for each country doing MDA are shown in Part 2 of this book.

Possible mild reactions to the MDA drugs include fever, headache, and dizziness. These adverse reactions are frequent and can be managed by the country MDA headquarters. All severe

### PacELF strategy

The PacELF strategy for achieving elimination involves two parts:

- (1) Annual MDA in countries where the disease is endemic, using DEC, as well as albendazole to stop transmission; and
- (2) Clinical management of infection, to minimize pathology in individuals who are already infected.

The treatment must achieve high coverage of the population to ensure that all the infected individuals in an implementation unit receive the required drugs. Mass drug administration should be done in whole implementation units within two months. When done in short intervals, MDA allows the complete cutoff of Mf transmission to mosquitoes (and hence to people) in the implementation unit.

Each PacELF country chooses its own strategies of distribution and social mobilization for MDA. In all cases, a register of the population is prepared,



adverse effects are reported immediately to the country MDA headquarters and the PacELF home office. Thus far, there have been no known life-threatening adverse reactions to MDA in the Pacific.

All PacELF countries, regardless of endemicity, implement activities to alleviate and prevent suffering in those already disabled and disfigured by the disease, although the number of such reported cases in the Pacific is low compared with other regions where the disease is endemic. The PacELF strategy is to conduct morbidity surveys, teach clinical case management, and promote surgery for hydrocoele. PacELF trains health-care workers to identify cases, provide home-based care, and promote hydrocoele surgery. Patients and their family members are taught clinical case management of lymphoedema to sustain home-based care and prevent acute attacks. PacELF recommends the following case management guidelines:

- (1) Washing the affected limbs thoroughly and gently with soap or antiseptic solution at least twice a day (Figure 2-24).
- (2) Drying affected limbs after washing to prevent maceration and super infections.
- (3) Elevating the limbs whenever possible.
- (4) Doing physical exercises to facilitate lymphatic flow, and
- (5) Using an antibiotic or antiseptics to prevent secondary infections on affected areas.

### PacELF plan

To meet its target of elimination by 2010, PacELF has drawn up a plan of action. The initial plan focused on these two steps:

- (1) Confirming that countries where the disease is not endemic are filariasis-free and eliminating filariasis by 2005 in countries where it is endemic or partially endemic; and
- (2) Confirming that all countries are filariasis-free and declaring the Pacific free of lymphatic filariasis by 2010.

A detailed monitoring and evaluation plan was developed for PacELF and described in two manuals produced in 2002—the PacELF manual and the book on the PacELF monitoring and analysis network (PacMAN). Both are designed for country programme managers. The manual contains background information on the biology and pathology of filariasis, particularly in the Pacific. It discusses the elimination strategies and provides the latest knowledge and techniques, customized to suit the needs of the PacELF members. It also describes diagnostic tools and information on vector mosquitoes.

The PacMAN book is specifically concerned with monitoring and evaluation. It describes the methodology used in PacELF surveys, and includes flow diagrams for the different types of surveys according to the recommended schedule for each country (see Part 2 of this book). The book also has country-specific guidelines on filariasis vector (mosquito) control.

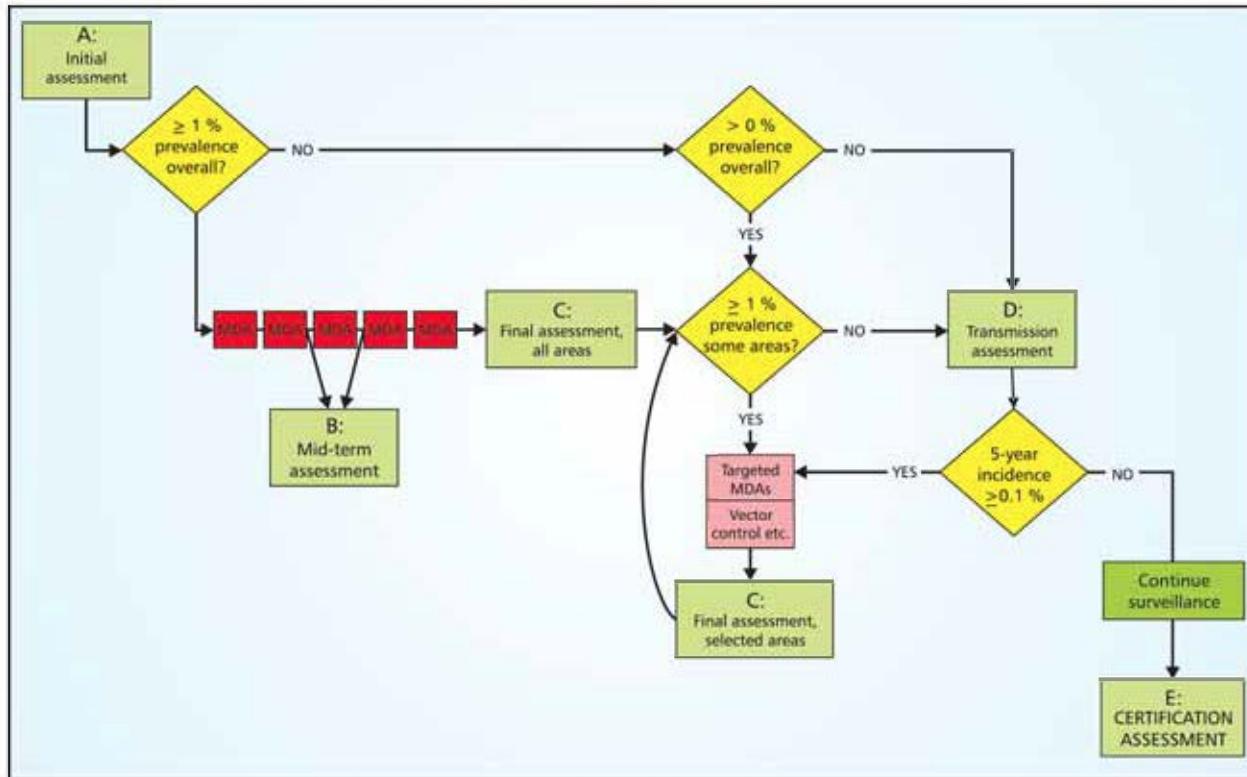
**Figure 2-24**



leg washing

Source: Vanuatu Ministry of Health

**Figure 2-25:** PacELF monitoring and evaluation plan from the PacMAN book



The PacELF monitoring and evaluation plan is shown in the diagram in Figure 2-25.

Four types of assessment survey are conducted.

- (1) A survey - a baseline assessment of prevalence in a country, using ICT, to allow countries to be classified by endemicity level (see Figure 2-25). For this survey, most countries use a convenience sample of villages or purposely selected villages in areas with known high levels of filariasis.
- (2) B survey - midterm evaluations done in sentinel sites selected at the start of MDA. Repeated surveys of prevalence using ICT are done in the same villages to monitor progress.
- (3) C survey - a thorough final evaluation covering all areas of the country, to determine whether ICT prevalence in all areas is below 1%. The decision whether or not to continue MDA beyond

five years depends on the result of this survey. Randomly selected clusters, each one composed of villages or groups of households, are surveyed.

- (4) D survey - an assessment of whether transmission is still occurring. This is done by surveying young children using a lot quality assurance sampling (LQAS) design.

PacELF countries are divided into three groups according to the results of the baseline (A) survey: non-endemic, if all the people tested are antigen-negative; partially endemic, if there are a few antigen-positives in some areas but overall prevalence is less than 1%; or endemic, if the baseline antigen prevalence is 1% or higher.

Figure 2-25 shows the timing of the surveys and the ones that a country must do, given its baseline endemicity. For example, non-endemic countries do not need to do the B and C surveys, but can proceed



directly to a D survey. Endemic countries do at least five rounds of MDA followed by a C survey.

To develop the PacMAN book and the PacELF guidelines, the GPELF guidelines were modified to suit the situation in the Pacific. The differences between the PacELF approach to monitoring and evaluation and the approach recommended by the GPELF are summarized in Table 2-6.

### Timeline

Table 2-7 shows the original timeline for the plan of action developed in 1999. Partially endemic and endemic countries were grouped together in the timeline. In the first years, individual country plans were to be established and applications submitted to the GPELF. From 2000 to 2005, MDA interventions would be carried out in endemic countries and non-endemic countries would conduct evaluation surveys. The Pacific Region would become filariasis-free by 2010.

Table 2-8 shows the timeline as it was revised in 2004. It does not differ greatly from the original, but country elimination in all countries except Papua New Guinea is now expected to occur in 2006 rather than 2005.

Table 2-6: Different approaches to programme monitoring and evaluation

	Global Programme	The Pac ELF Way "PacMAN"
Initial assessment	IQAS by ICT	(A) Village survey (convenience of cluster) by ICT
Baseline	Sentinel sites by MI	
Midterm	Sentinel sites by MI	(B) Sentinel villages by ICT
Stop-MDA survey	Sentinel/spot-check sites If MF $\geq$ 1%: more MDA If MF<1%: IQAS by ICT in 3000 schoolchildren If ICT<0.1%: stop MDA	(C) Cluster by ICT If ICT<1%: stop MDA; if ICT $\geq$ 1%: targeted MDA, vector control
Transmission interruption	ICT<0.1% in children	(D) ICT<0.1% in children

Table 2-7: Original Timeline

Step	Year	Non-endemic	Endemic
1	1999	Planning	Planning
	2000		
	2001		Intervention
	2002	Evaluation	
	2003		Evaluation
	2004		Country Elimination
2	2005		
	2006		Planning
	2007		
	2008		Follow-Up and Confirmation
	2009		
	2010		Regional Elimination

Table 2-8: Revised timeline

Step	Year	Non-endemic	Partially endemic	Endemic except PNG	Papua New Guinea (PNG)	
1	1999	Planning	Planning	Planning	Planning	
	2000					
	2001	Evaluation	Treatment or Evaluation	MDA		
	2002					
	2003					
	2004					
	2005					
2	2006				Country Elimination	
	2007					
	2008				Follow-Up and Confirmation	
	2009					
	2010				Regional Elimination	

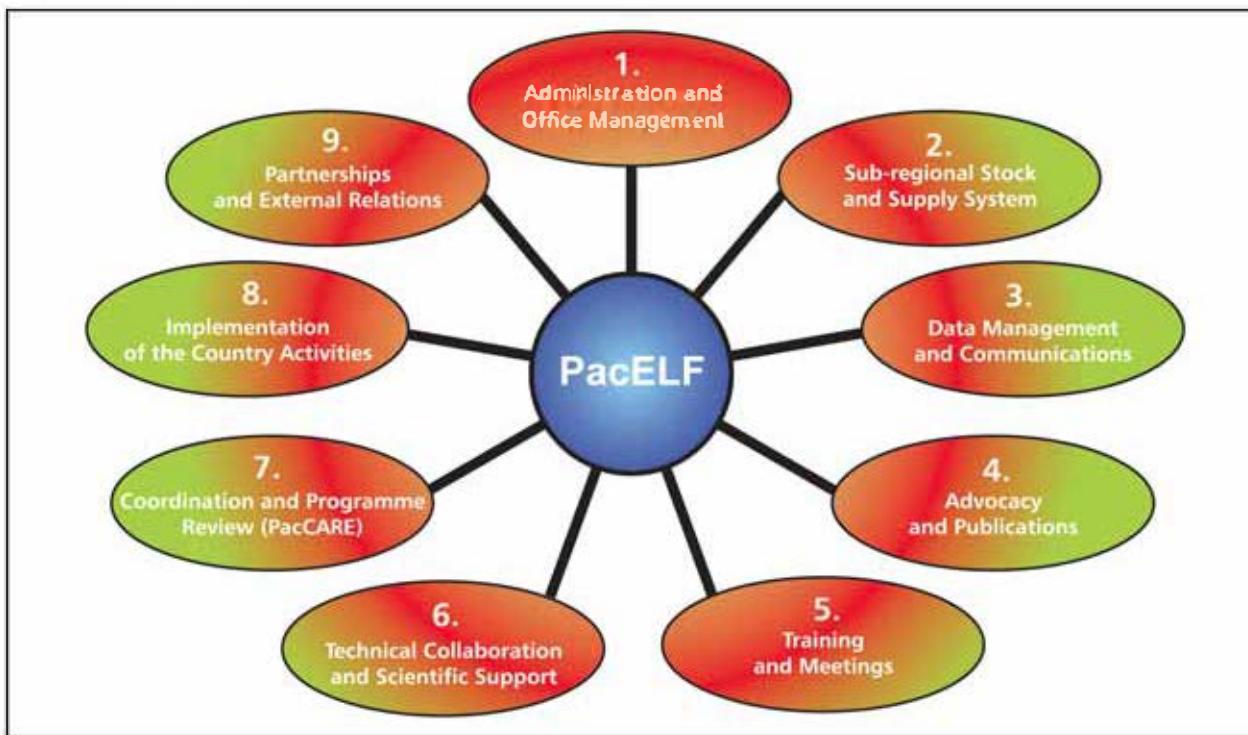
# Approach and Activities



PacELF represents the Pacific community in the Global Alliance and is the Pacific regional counterpart of the WHO GPELF. It is a network of support to the Pacific countries and mediator of information sharing between the Pacific communities and outside partners. A review group,

PacCARE, led by representatives from the Pacific ministries of health coordinates and approves the activities of the various countries. This chapter describes the nine essential services provided by the PacELF office in Suva, Fiji. These services are shown in Figure 3-1.

Figure 3-1: Roles of the PacELF home office



## ADMINISTRATION AND OFFICE MANAGEMENT

The PacELF home office in Mataika House, Tamavua, Fiji, officially opened in July 2001. A small number of staff at the office carry out day-to-day administration and office management duties and generally manage PacELF activities—drug supply coordination (acquisition, storage, and shipping); operational research; technical assistance to countries; annual PacELF and PacCARE meetings; information, education, and communication (IEC) materials development; the PacELF website; communications with the PacELF countries and with

programme partners, collaborating scientists, and technical advisers; and personnel and training. The home office keeps correspondence files, documents and reports from GPELF and PacELF countries, and all IEC materials developed by PacELF staff, member countries, WHO, and partners, and ships the IEC materials to PacELF countries at their request. The office also keeps contact information on all PacELF staff, country programme managers, partners, collaborators, and technical advisers.

Figure 3-2



The PacELF home office

## SUB-REGIONAL STOCK AND SUPPLY SYSTEM

One of the most important functions of the PacELF home office is coordinating and controlling drug supplies and equipment, through a simple and efficient sub-regional stock and supply system (Figures 3-4 and 3-5), so that the countries can implement their activities without shortages. The home office submits to the partners a single request for supplies and equipment on behalf of the region.

Before its first MDA, a country must first submit to the PacELF office an application form with details about the country and its elimination programme, as well as the amount of albendazole, DEC, and ICT kits it needs. It must also re-apply for subsequent MDAs, and must submit at the same time the annual report on the previous MDA, which the PacELF forwards to the Global Alliance for Filariasis Elimination in February or

August. PacELF and PacCARE review applications and annual reports during their annual meetings. If an application is approved, PacCARE notifies the PacELF home office, which then ships the requested drugs and equipment to the country. The country must send back a receiving report to confirm the receipt of shipments. The home office keeps detailed inventories of drugs and equipment and reports these to donor partners. It also maintains a buffer stock at its main warehouse for unplanned and immediate needs.

There are two separate supply systems: DEC tablets and ICT kits are supplied to PacELF by the Japanese Government through JICA for 14 PacELF countries (Cook Islands, Fiji, Kiribati, the Marshall Islands, the Federated States of Micronesia, Nauru, Niue, Palau, Papua New Guinea, Samoa, Solomon Islands, Tonga, Tuvalu, and Vanuatu);

Figure 3-4



PacELF warehouse

Figure 3-5



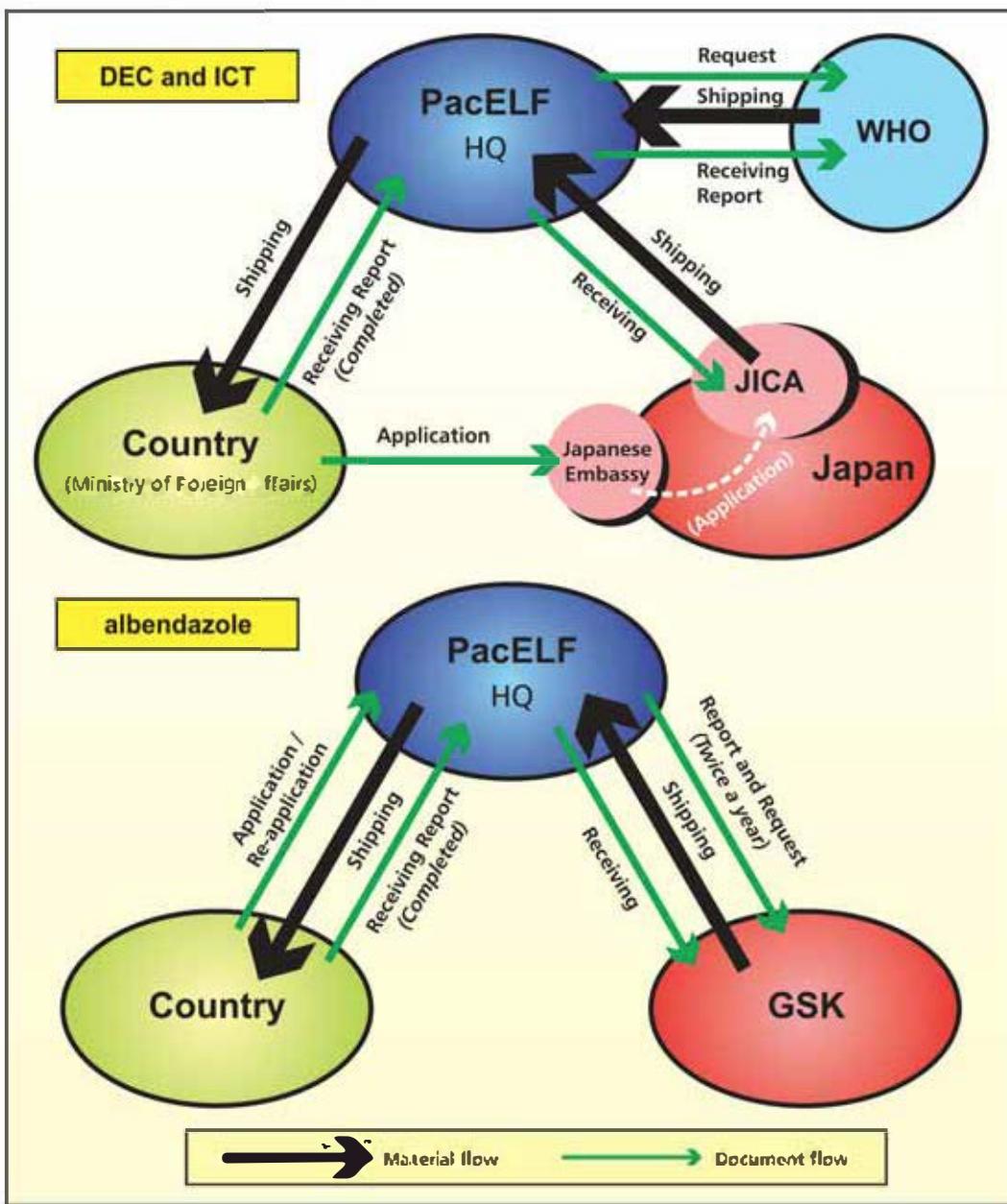
PacELF IEC stock

albendazole is supplied by GSK. Figure 3-3 shows the flow of materials and paperwork between donors and countries through PacELF.

GSK shipped albendazole tablets directly to the countries until 2000. The company now ships the tablets to the PacELF warehouse in Fiji and PacELF distributes them to the countries twice a year. Orders for the tablets must be placed with the head office by

February or August each year. A country that is planning an MDA in the first half of the year (January to June) must have sent in its order by August of the previous year. If the MDA is in the second half of the year (July to December) the order must have been placed in February of that year. Table 3-1 shows how the countries ordered their supplies and received them from PacELF in 2004.

**Figure 3-3:** Supply flowchart of DEC, ICT, and albendazole



**Table 3-1:** Process of ordering and receiving drug supplies, 2004

Item	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Country MDA			French Polynesia Wallis and Futuna		Tonga	Vanuatu Cook Islands	Niue		American Samoa Fiji Kiribati Tuvalu			
Country blood survey	Tonga	Tonga			Samoa Tuvalu	Samoa Tuvalu	Niue Samoa Tuvalu	Niue Samoa Tuvalu	Samoa	Samoa	Samoa	Samoa
ICA supply		Deadline for country applications			Items received at PacELF warehouse	Items shipped by PacELF						Items shipped by PacELF
GSK supply		Deadline for country annual reports	Request sent to GSK		Albendazole received at PacELF warehouse	Albendazole shipped by PacELF			Request sent to GSK	Albendazole received at PacELF warehouse	Albendazole shipped by PacELF	

Since 2000, PacELF has supplied close to 6.5 million albendazole tablets, 80 million DEC tablets, and more than 200,000 ICT cards to the countries for their various activities to eliminate lymphatic filariasis (Table 3-2).

**Table 3-2:** Drug supplies received by the PacELF home office, 2001–2004

Item	2001	2002	2003	2004	Total, 2001–2004
ALB (tablets)	1 522 000	1 365 000	2,070 000	1 535 300	6 492 300
DEC (tablets)	39 925 000	12 510 000	12 810 000	15 215 000	80 460 000
ICT (test cards)	33 000	38 500	73 000	68 000	212 500

## DATA MANAGEMENT AND COMMUNICATIONS

### Data Information System

The PacELF home office maintains a data management and communication network, which allows the PacELF countries to share information with one another and with the PacELF office. PacELF uses this network to collect data, reports, and application forms from the countries and to supply the countries with drugs, test kits, reports, data, and IEC materials.

The PacELF Data Information System (DIS) consists of two databases—one for MDA data (Figure 3-6) and the other for blood survey results (Figure 3-7). Figure 3-8 is a process diagram of the system. All the countries

have the database file for standardized data collection. Countries collect data from MDA and blood surveys and enter these into the system (step 1). The following MDA information is collected by age group, sex, and geographical unit: the number of people registered, the number of people treated, and the census population. From this information, the system calculates country totals and coverage. Blood survey information collected consists of the number of people tested and the number of people found to be antigen-positive, by age group, sex, and geographical unit. The country data are sent by email or fax or on disk to the PacELF home office, where they are

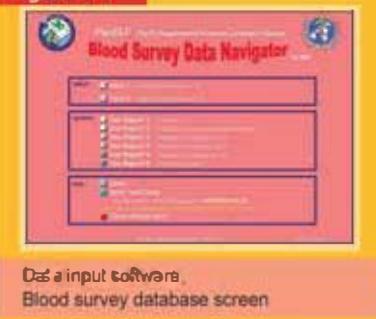
**Figure 3-6**Data input software,  
MDA database screen**Figure 3-7**Data input software,  
Blood survey database screen

Figure 3-8: Flow chart of the PacELF Data Information System

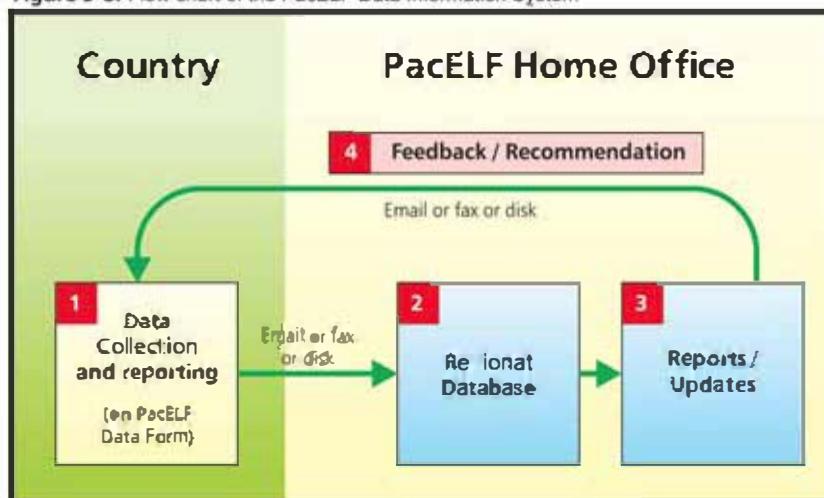


Figure 3-9: Home page of PacELF website

The home page of the PacELF website features a top navigation bar with links for 'How Can You Help', 'Helping Tools', and 'Contact Us'. The main content area includes a 'Welcome to PacELF' section with a photo of a person in a village setting. Below this is an 'ANNOUNCEMENT' box for the '4th meeting of the Global alliance for the elimination of lymphatic filariasis' (March 29-30 - 2003), with a link to the 'GELF Meeting Page'. There are also sections for 'Latest news', 'Upcoming Events', and 'Publications'. A sidebar on the left lists 'About PacELF', 'Our Work', 'Progress', 'Country Programmes', 'Reports', 'Member Newsletters', 'Related Links', 'FAQ', 'FactSheets', 'Publications', 'News & Events', and 'SARPP Meeting'. A 'World Health Organization' logo is at the bottom left, and a 'PacELF News' poster is on the right.

aggregated and stored in the regional database (step 2). Each year, the home office analyses the data and prepares reports (step 3). From the submitted data, it determines the age and sex distribution of the total population, the sampled population, the treated population, and the infected population for each country. The PacELF home office also reports prevalence and treatment coverage data by island group, village, district, or other appropriate implementation unit.

### PacELF website

The PacELF website is a key part of the communication network. The website, [www.pacelf.org](http://www.pacelf.org), launched in October 2002, is a means of sharing ideas and enhancing advocacy. Information about PacELF—its goals, work, and progress—and the individual country programmes can be found on the site (Figures 3-9 and 3-10). There are answers to frequently asked questions about filariasis and PacELF, as well as a list of all PacELF publications, links to other pertinent websites, and PacELF contact information. The News and Events section is regularly updated, with the help of summaries and photos of current activities submitted by the member countries.



**Figure 3-10****News & Events 2002 • October****The 1st MDA in Fiji**

Mr. Solomone Naivatu, Honorable Minister for Health, Fiji taking the Filoxin tablets during MDA launch 2002. Dr Shigeru Omi, WHO Regional Director for Western Pacific (seated on left) was Chair Guest and also took the medications. (Launch Date: 4th October 2002). Trained public health nurses supervised while dignitaries and the public took the drugs.

**News & Events 2003 • October****Samoa's 5th MDA was launched on the 5th of October 2003**

Samoa's 5th MDA was implemented this year and was officially launched on the 5th of October. Community awareness and promotion workshops for each health district were conducted before the MDA started. There was good community participation from village mayors, church ministers, presidents of women's committees, and volunteer drug distributors at the workshops. During the first week of the MDA the response from the community was very good.

**News & Events 2004 • March****The Global Alliance Meeting (GAELF 3) held in Cairo, Egypt on 23 - 25 March 2004**

The Third Meeting of the Global Alliance Meeting to Eliminate lymphatic filariasis (GAELF 3) recently held in Cairo, Egypt was attended by PacELF Team Leader Dr. Karun Ichimori, Non Minister for Health (Samoa) Mr. Muliitalo Satausa Vili, Director General of Health (Samoa) Dr. Aida Mill Eti Endea, Chief Executive Officer Health (Fiji) Dr. Lepani Wagale-Sireva and Chairman PacCARES (Dr Joe Koroivau).

On behalf of the members of PacELF, Fiji invited the forum to our part of the region in 2006. GAELF 4 will be hosted in Fiji in 2006.

**News & Events 2004 • September****PNG is going to start MDA in June next year**

Message from Dr James Wangi (Director Disease Control, Papua New Guinea), "Hello, every one upon arrival from our good and enjoyable meeting in Samoa, we have gone into action to put our national ELT action plan together. Dr Ichimori was here for close to 10 days and assisted us to complete our national plan and also, provincial action plan for the province we will conduct the MDA in June next year. So certainly we have some interesting news for the website."

**Selected news and events from the PacELF website**

## ADVOCACY AND PUBLICATIONS

PacELF has developed and published many documents with one purpose: to increase awareness of filariasis and promote the unique Pacific programme to eliminate the disease. Every year since 2001, PacELF has published a summary report on the annual meeting, which contains brief descriptions of the presentations and special sessions, as well as recommendations for the various country programmes. Since 2002, it has also published an annual review of achievements in the Our Work series. In 2004, the PacELF office published the PacELF Handbook and a book on the

PacELF Monitoring and Analysis Network (PacMAN) to guide country programme managers.

### IEC materials

PacELF has developed many information, education, and communication (IEC) materials for the programme, including posters, pamphlets in English and French, logo stickers, a calendar, and a video. The head office keeps a ready supply of all IEC materials and ships them to countries on request. Figure 3-11 shows some of these IEC materials.

Figure 3-11: PacELF regular publications and IEC materials

**ANNUAL MEETING REPORTS**

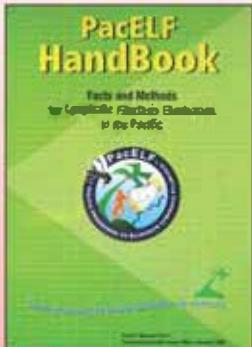
- 3rd Annual Meeting Report, 2001**  
Published in November 2001
- 4th Annual Meeting Report, 2002**  
Published in November 2002
- 5th Annual Meeting Report, 2003**  
Published in November 2003
- 6th Annual Meeting Report, 2004**  
Published in November 2004
- 7th Annual Meeting Report, 2005**  
Published in October 2005

**ANNUAL RECORDS OF ACHIEVEMENTS**

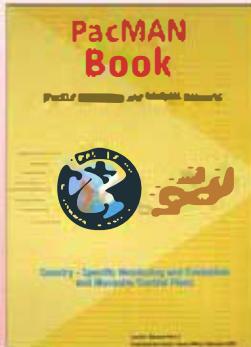
- Our Work 2002 (Progress Report, January–December 2002)**  
Published by April 2003
- Our Work 2003 (Progress Report, January–December 2003)**  
Published in April 2004
- Our Work 2004 (Progress Report, January–December 2004)**  
Published in April 2005
- Pacific Programme to Eliminate Lymphatic Filariasis  
PacELF Atlas 2002**  
Atlas (describes the filariasis situation and vectors in each PacELF member country)  
Published in 2002



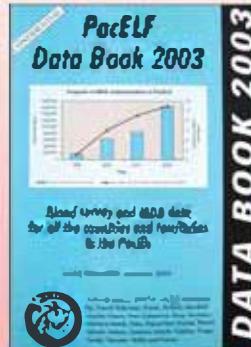
## REFERENCES AND GUIDELINES



PacELF Handbook  
(PacELF manual, part 1)  
Published in April 2004



PacELF Handbook  
(PacELF manual, part 2)  
Published in April 2004

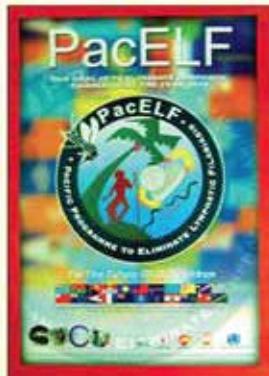


Data Book 2003  
(blood survey and MDA data  
on the member countries)  
Published in 2004



Fact Sheet  
Gives basic information  
about the programme  
Published in 2004

## IEC MATERIALS



Poster 1  
Published in 2001



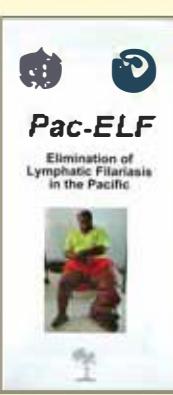
Poster 2  
Published in August 2003



Calendar  
Published in 2004



Poster  
Published in November 2005



Pamphlet  
Introduction  
to PacELF  
Published in 2001



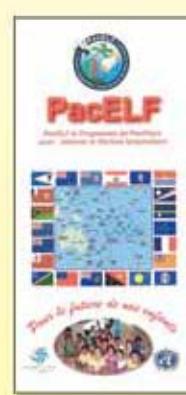
MDA Pamphlet (English)  
Introduction to mass  
drug administration  
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MDA Pamphlet (French)  
Introduction to mass  
drug administration  
Published in November 2004



Pamphlet (English)  
Introduction  
to PacELF  
Published in 2003



Pamphlet (French)  
Introduction to PacELF  
Published  
in November 2004





## TRAINING AND MEETINGS

The PacELF home office organizes annual meetings to share information, set guidelines for the different countries, review their accomplishments, recommend improvements in their programmes, and train their programme

staff. At the meetings partners, consultants, and representatives from other regional programmes to eliminate lymphatic filariasis give updates on their activities and on relevant scientific information. Table 3-3 lists the PacELF meetings that have been held so far.

The PacELF meetings are a time for sharing, learning, and having fun. Country representatives give updates on their programme and receive feedback from other PacELF members (Figure 3-12).

Each meeting also features workshop-style training sessions (Figure 3-13). At the 2004 annual meeting in Apia, participants had the chance to learn about mosquito identification, lymphoedema case management, and field diagnostic tests (ICT / Mf slides).

The evenings are filled with social events, where the meeting participants perform skits and share a little of their culture through traditional songs and dances (Figure 3-14).

An annual meeting report is compiled and published shortly after each meeting. Each report contains

Table 3-3: Annual PacELF meetings

Meeting No.	Date	Location	Number of Country Participants
1	28–29 Jun 1999	Brisbane, Australia	14
2	16–20 Oct 2000	Brisbane, Australia	16
3	24–29 Sep 2001	Nadi, Fiji	20
4	19–23 Aug 2002	Rarotonga, Cook Islands	17
5	22–26 Sep 2003	Lautoka, Fiji	21
6	23–27 Aug 2004	Apia, Samoa	17
7	22–26 Aug 2005	Suva, Fiji	13

Figure 3-12



5th PacELF Annual Meeting



highlights of country accomplishments, summaries of presentations, descriptions of training sessions, and photographs of the meeting. It also documents the recommendations developed and approved by the participants. The issues and outcomes at each of the seven annual meetings are listed below.

#### **1st Annual PacELF Meeting in Brisbane, Australia, 1999**

- Officially established PacELF
- Created the PacELF Coordinating Body and appointed its members

#### **2nd Annual PacELF Meeting in Brisbane, Australia, 2000**

- Established MDA guidelines
- Recommended a methodology for surveys and the use of the ICT kit
- Called for the establishment of a surveillance network based in the PacELF office in Suva and the development of specific surveillance guidelines for PacELF countries
- Recommended that studies be carried out to increase understanding of mosquito vectors—their biting habits, biting times, and preferred breeding sites

#### **3rd Annual PacELF Meeting in Nadi, Fiji, 2001**

- Finalized MDA guidelines
- Adopted the PacELF data collection and reporting system
- Reviewed and updated the PacELF plan of action

#### **4th Annual PacELF Meeting in Rarotonga, Cook Islands, 2002**

- Reconfirmed the policy to use ICT for baseline data collection and evaluation
- Recognized social mobilization as a key factor in maintaining high levels of MDA compliance
- Identified areas of research to better understand social issues

**Figure 3-13**



Workshops during the 6th PacELF Annual Meeting in Samoa in 2004

**Figure 3-14**



Sharing cultures at the PacELF annual meetings, 2001–2004

related to filariasis elimination activities

#### **5th Annual PacELF Meeting in Lautoka, Fiji, 2003**

- Reviewed country action plans and evaluated progress in implementing MDA and mid-term surveys

#### The PacELF Way Towards the Elimination of Lymphatic Filariasis in the Pacific

- Reviewed progress towards the inclusion of targeted vector control in national filariasis elimination strategies
- Identified opportunities for integrating PacELF with other disease control programmes
- Recommended the standardization of data collection and reporting
- Discussed post-MDA activities, and the process of consultation for stopping MDA and confirming elimination in the Pacific Island countries
- Agreed on the development of a PacELF handbook and data book to provide information and guide monitoring, evaluation, and post-MDA activities
- Reviewed and discussed potential alternative methods after five rounds of MDA
- Requested the holding of a regional workshop on vector control in 2006
- Recommended the publication of a book on PacELF to share the experiences of the Pacific Island countries in filariasis elimination

#### 6th Annual PacELF Meeting in Apia, Samoa, 2004

- Developed country action plans for the following:
  - Morbidity assessment and case management programmes
  - Integration with other disease control programmes
  - Post-MDA strategies
  - Agreed to support the 4th Global Alliance Meeting in Fiji in 2006

#### 7th Annual PacELF Meeting in Suva, Fiji, 2005

- Recommended that PacELF continue to perform its current functions, technical assistance, and communications among countries
- Strengthened the network in support of integrated vector-borne disease in the Pacific focused on capacity building for vector control, social mobilization, and operational research
- Recommended the conduct of C and D surveys in accordance with PacMAN guidelines to determine the next steps
- Finalized the PacELF Book development including the progress and achievements of programmes

## TECHNICAL COLLABORATION AND SCIENTIFIC SUPPORT

Figure 3-15



Monitoring and Evaluation Meeting in Atlanta, Georgia, USA

PacELF collaborates with academic and scientific organizations to ensure that PacELF activities are based on sound scientific evidence. Technical collaborators have provided guidance to PacELF in surveillance and monitoring, clinical diagnostics, clinical case management, vector biology and control, survey methodology, data management, and operational research (Figure 3-15). From time to time, WHO provides short-term consultants to write



guidelines, conduct workshops, evaluate country programmes, and perform other scientific work for PacELF (Figure 3-16). Public health scientists also give advice to country programmes or carry out technical support functions such as operational research, social research, or survey design when asked to do so. Table 3-3 lists the technical collaborating organizations and their areas of guidance.

Figure 3-16



Consultant working with PacELF staff

**Table 3-4:** Technical collaborating organizations

Organization	Technical Support Role
Centers for Disease Control and Prevention (CDC), USA	Surveillance, clinical diagnostics, vector control
Emory University LF Support Center, USA	Clinical diagnostics, operational research, cost analysis
Institut Louis Malardé, French Polynesia	Vector control
James Cook University (JCU), Australia	Clinical diagnostics, monitoring
Liverpool LF Centre, UK	Technical support to Vanuatu
World Health Organization	All areas
Atlanta LF Monitoring and Evaluation Group, USA	Surveillance and monitoring, survey methodology
Secretariat of the Pacific Community (SPC)	Demography, mapping
Aichi Medical University, Japan	Clinical diagnostics, treatment

LF = lymphatic filariasis

## COORDINATION AND PROGRAMME REVIEW

The PacELF Coordinating Body (CB) was formed during the first annual meeting in 1999 and its members were appointed by the participants at the meeting. The CB was expected to ensure, on behalf of the 22 member countries, that the aims and objectives of PacELF were achieved. It met at least once a year and organised sub-regional functions from time to time, when required, to carry out the following functions:

- Promote the purpose and activities of PacELF
- Set up and maintain information and communication networks to help the member countries

- Implement their plans of action to eliminate lymphatic filariasis
- Coordinate technical advice, supplies, and local costs for each country's plan of action and sub-regional programmes
- Foster support for PacELF by maintaining contact with WHO, SPC partners, and NGOs
- Keep abreast of issues tackled by the Global Programme to Eliminate Lymphatic Filariasis

During the first years of the PacELF CB, the global programme approved country applications for activities to eliminate lymphatic filariasis. The CB reviewed PacELF country data,

suggested strategies, and helped the countries develop action plans. In 2000, the global programme moved to decentralize the approval of country applications and suggested the creation of regional review groups.

The PacELF Coordination and Programme Review Group (PacCARE) was formed in 2001 to coordinate PacELF activities. PacCARE members are nominated by the PacELF member countries and appointed by the WHO Regional Director for the Western Pacific. They serve for a term of three years and may be re-appointed by the WHO Regional Director for another three. There are now seven members, including one representative from each of the four recognized regions of the Pacific—Micronesia, Melanesia, Polynesia, and the French territories. These regional representatives work together with a PacELF secretariat and other technical experts in lymphatic filariasis from academic institutions and scientific research organizations (Figure 3-17).

PacCARE members meet at least once a year and organize PacELF meetings from time to time, when required, to fulfill the following functions:

- Promote the purpose and activities of PacELF
- Give technical guidance to countries in developing national plans of action for eliminating

lymphatic filariasis that are consistent with public health policies and consider the specific issues in each country, and in reviewing those plans of action

- Support countries in implementing their national plans according to global and regional strategies for eliminating the disease
- Monitor evaluation after the fifth MDA, with C- and D-type surveys
- Set up and maintain information networks between PacELF member countries, and between the regional and the global programme
- Promote technical coordination with WHO and scientific agencies and institutions to support country programmes
- Promote coordination with WHO, other partners and donor agencies, and NGOs to support PacELF
- Review country programmes and make recommendations to the WHO Regional Director, in line with the PacELF strategy

PacCARE meetings coincide with PacELF annual meetings to review country programme reports and approve re-applications for supplies. Between meetings, members communicate by email to quickly respond to country needs. PacCARE develops specific recommendations from the review meetings to assist individual country programmes.

Figure 3-17



The 4th PacCARE Meeting in 2003 in Suva, Fiji



Table 3-5: Application and MDA Plan, 1999–2006

	1999		2000		2001		2002		2003		2004		2005		2006			
	J	F	M	A	J	S	O	N	D	J	F	M	A	J	S	O	N	D
American Samoa	■				Not Completed	●				●			●					
Cook Islands	■					●				●			●					
Federated States of Micronesia			■															
Fiji	■									●			●					
French Polynesia**				■	●		●			●		●		●				
Guam*																		
Kiribati				■			●					●		●		■		
Marshall Islands*																		
Nauru*																		
New Caledonia**																		
Niue	■				■			●		●		■		●				
Northern Mariana Islands*																		
Palau**																		
Pitcairn Islands*																		
Papua New Guinea													■		■			
Samoa	■				■		●			●		■		●				
Solomon Islands*																		
Tonga	■						●			●		■		●		■		
Tokelau*	■																	
Tuvalu																		
Vanuatu	■				■		●			●		■		●		■		
Wallis and Futuna**																		
	J	F	M	A	J	S	O	N	D	J	F	M	A	J	S	O	N	D
	1999	2000	2001	2002	2003	2004	2005	2006										
	■ Application	● Reapplication	■ MDA	■ Future MDA	* Non-endemic country	** Partially endemic country												

## IMPLEMENTATION OF COUNTRY ACTIVITIES

PacELF supports the implementation of country activities to eliminate lymphatic filariasis through the following functions:

- Assisting the countries in developing their action plans
- Arranging the financial supplies means to implement surveys and MDA

- Providing technical advice on MDA strategies, health communications, and survey methodology
- Supporting the preparation of annual reports

The PacELF strategy calls for five rounds of MDA followed by a prevalence survey in all sub-districts to assess impact and determine the next steps.

Table 3.6: Country programme by year

	Country	1997	1998	1999	2000	2001	2002	2003	2004
Non-Endemic (6 countries)	Guam	Prevalence rate				0.0%			
	Nauru	Prevalence rate		0.3%					
	Northern Mariana Islands	Prevalence rate				0.0%			
	Pitcairn Islands	Prevalence rate					0.0%		
	Solomon Islands	Prevalence rate		0.0%				0.3%	
	Tokelau	Prevalence rate		*0.1%					
Partially Endemic (5 countries)	Federated States of Micronesia	Prevalence rate			0.2%				
	Marshall Islands	Prevalence rate				0.1%			
	New Caledonia	Prevalence rate						0.5%	
	Palau	Prevalence rate				0.4%			
	Wallis and Futuna	Prevalence rate			0.7%		60%	65%	66%
Endemic (11 countries)	American Samoa	Prevalence rate		16.5%	11.5%				
	Cook Islands	Prevalence rate		8.6%	7.6%				
	Fiji	Prevalence rate			16.6%				
	French Polynesia	Prevalence rate			13.8%				
	Kiribati	Prevalence rate			1.7%				
	Niu	Prevalence rate		3.1%	1.3%				
	Papua New Guinea	Prevalence rate				6.0%			
	Samoa	Prevalence rate		4.5%	4.5%				
	Tonga	Prevalence rate		2.7%				2.5%	
	Tuvalu	Prevalence rate		22.3%				12.1%	
	Vanuatu	Prevalence rate	4.8%			8.0%			
		MDA							
		MDA - Jun			83%	84%	84%	87%	85%

\* Non-resident

MDA

Baseline Assessment A

Midterm Assessment (B)

Final Assessment (C)



By 2005, the following activities had been implemented in the PacELF member countries:

- Baseline prevalence surveys in all 22 countries
  - MDA initiated in all 11 fully endemic countries
  - Targeted MDA initiated in three out of five partially endemic countries
  - At least three rounds of MDA completed in 10 out of 11 fully endemic countries
  - Five rounds completed in five countries
  - Four rounds completed in four countries
  - Three rounds completed in one country
- All endemic countries with a baseline prevalence greater than 1% had initiated MDA by 2002 except for Papua New Guinea, which was expected to initiate MDA in the second quarter of 2005. Samoa was the first to complete five rounds of MDA in 2003 and finished the C-type survey in 2004. Cook Islands, French Polynesia, Niue, and Vanuatu completed five rounds of

Figure 3-18: Endemicity in PacELF countries

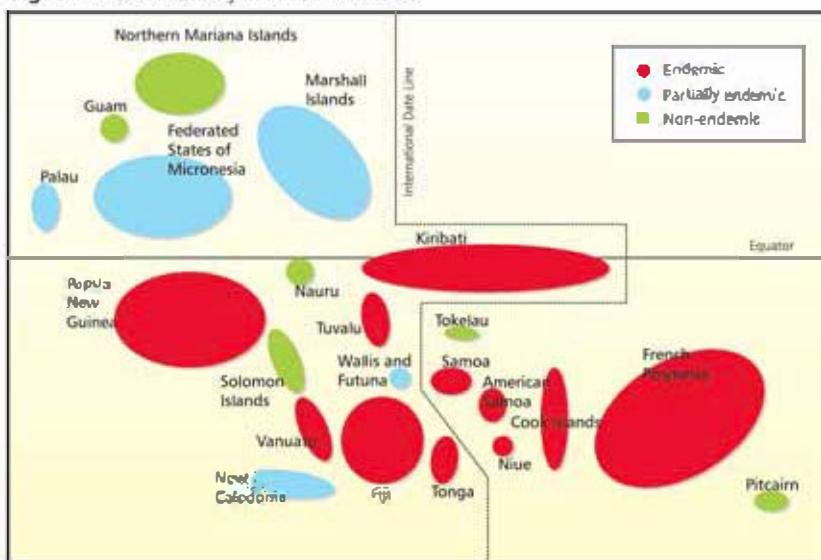
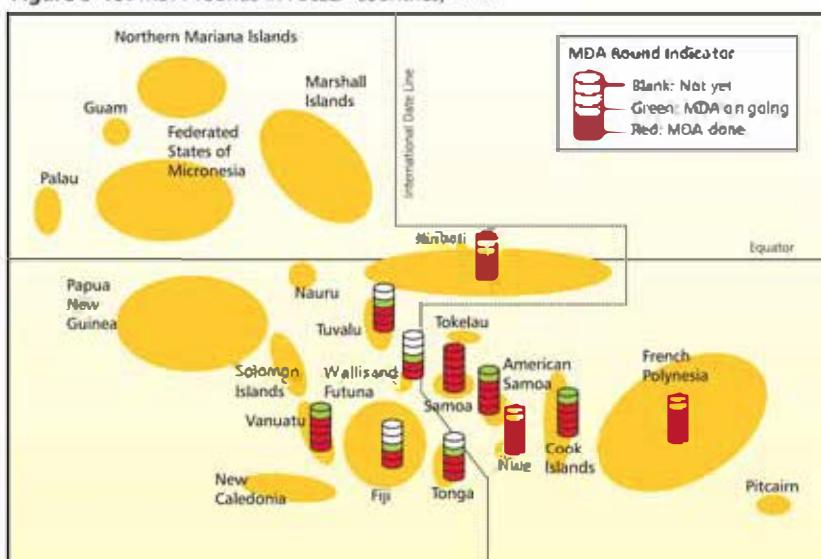
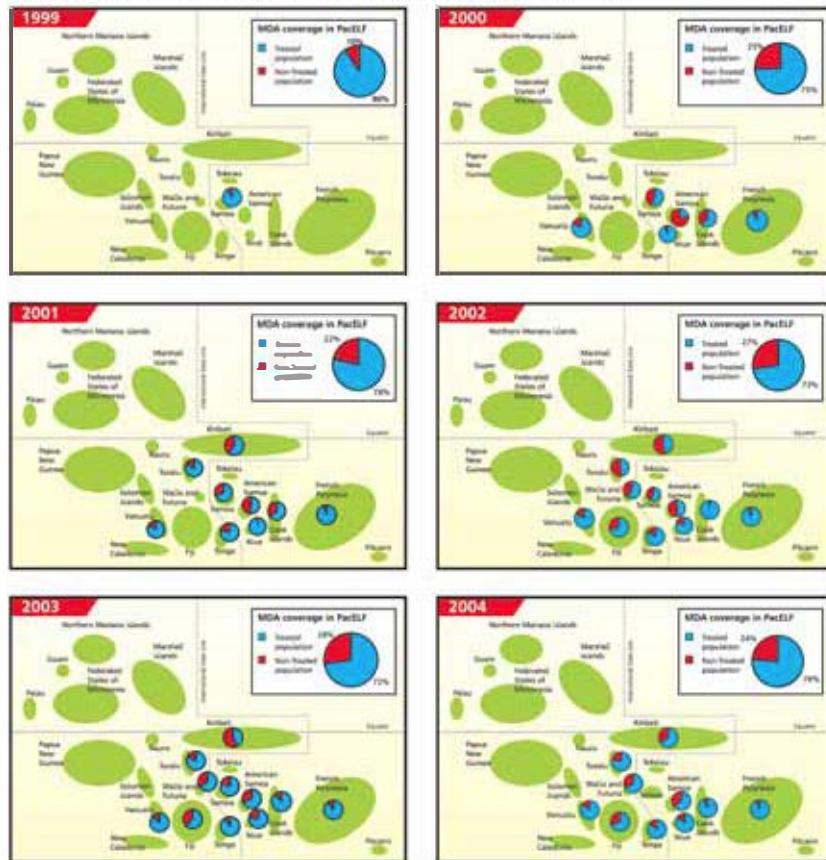


Figure 3-19: MDA rounds in PacELF countries, 2004



**Figure 3-20: MDA coverage of the at-risk population, 1999–2004\***



\*Based on country annual reports

MDA in 2004. These four island countries are ready to start their C-type evaluation survey in 2005. Four more countries—American Samoa, Kiribati, Tonga, and Tuvalu—will complete five rounds of MDA in 2005. Among the partially endemic countries, Wallis and Futuna has completed three rounds of MDA, while the Federated States of Micronesia and the Marshall Islands have done one or two MDA rounds in their endemic regions.

Drug coverage varies between islands and rounds of distribution. High coverage is recommended, but lower coverage results do not change the PacELF strategy. Regardless of treatment coverage, a C-type survey is still conducted after five rounds of MDA, and consultation is required to determine whether to continue or stop the activities.

## PARTNERSHIPS AND EXTERNAL RELATIONS

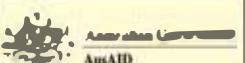
One of the strengths of PacELF is its network of external partners. PacELF would not have progressed this far without the persistent commitment and contributions of those partners. Each one plays a vital role in country activities

towards the elimination of lymphatic filariasis in the Pacific. PacELF has successfully managed its external relations with its partners and maintained financial and technical support for all activities. Each country



also keeps up local partnerships with governmental and nongovernmental organizations, as well as private companies and corporations. Besides these partners, PacELF maintains relationships with similar regional and global programmes. It comes as no surprise, then, that PacELF and its partners will support the fourth meeting of the Global Alliance to Eliminate Lymphatic Filariasis to be hosted by the Government of Fiji in 2006.

Table 3-7: PacELF partners and their contributions

Australian Agency for International Development (AusAID)	 AusAID	Financial support
Centers for Disease Control and Prevention (CDC)		DEC tablets for American Samoa; financial support; technical assistance
Emory University LF Support Center		Technical assistance
GlaxoSmithKline (GSK)		Albendazole tablets; financial support; technical assistance
Institut Louis Malardé		Technical assistance
James Cook University (JCU)		Technical assistance
Japanese Government (Ministry of Health, Labour and Welfare, Ministry of Foreign Affairs, and Embassy of Japan in Fiji)		Financial support (local cost for country activities) through the Western Pacific Regional Office of WHO; IEC materials
Japan International Cooperation Agency (JICA)		DEC tablets; ICT test kit; 5 Japan Overseas Cooperation Volunteer (JOCV) volunteers; financial support
Liverpool Lymphatic Filariasis Support Centre		Technical assistance
Ministry of Health, Fiji		Office facilities (Mataika House)
Secretariat of the Pacific Community (SPC)		Technical assistance
United Nations Volunteers (UNV)		Volunteer
Voluntary Services Overseas (VSO)		Volunteer
World Health Organization (WHO)		Technical assistance; financial support; logistic support; IEC materials

# Progress and Achievements



This chapter discusses the progress and impact of PacELF activities from 1999, when the programme began, to 2004, summarizing information given in earlier chapters and in Part 2 of this book, and it looks forward to what will be done in the next five to 10 years. It describes the delivery of the programme and the achievements of the countries in the

course of their MDAs and surveys in the first five years of the programme. The costs of the PacELF activities are also estimated. Much of this chapter is devoted to describing the impact of PacELF on

- Filariasis elimination,
- The health system, and
- Society and politics.

## PROGRESS

### BASELINE PREVALENCE

Before mass drug administration (MDA), all countries carried out a baseline survey of ICT prevalence ("A" survey). The survey data were used to classify the countries into groups according to their endemicity. Countries with no antigen-positives (excluding non-residents and immigrants) are considered non-endemic; those countries where up to 1% of the population tested positive for the antigen are partially endemic; and those with more than 1% positive for the antigen are endemic.

As shown in Table 4.1, six countries are classified as non-endemic, five as

partially endemic, and 11 as endemic. All Micronesian countries except Kiribati are non-endemic or partially endemic; Kiribati has a low prevalence rate of 1.7%. All of the other endemic countries are in Melanesia or Polynesia (Figure 4-1), with the highest prevalence rates observed in countries where filariasis is transmitted by *Aedes* vectors: Tuvalu (22.3%), Fiji (16.6%), American Samoa (16.5%), and French Polynesia (13.8%).

The countries found to be non-endemic are Guam, Nauru, the Northern Mariana Islands, the Pitcaim Islands, Solomon Islands, and Tokelau. In the case of the Pitcaim Islands, the PacELF



Table 4-1: Baseline survey results

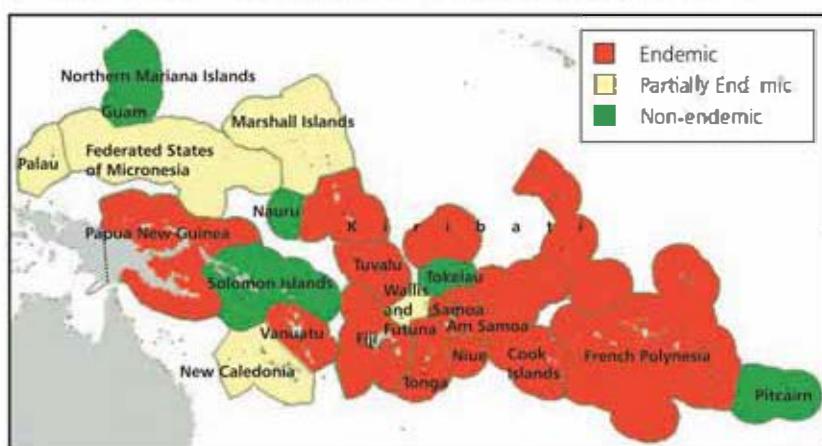
Endemicity Level	Country	Baseline Year	Baseline Population	Baseline Antigen+ Prevalence (by ICT)	Number of Estimated Antigen+ Cases
Non-endemic	Guam	2001	157 629	0.0%	0
	Nauru	1999	10 013	0.3% <sup>a</sup>	30
	Northern Mariana Islands	2001	71 416	0.0%	0
	Pitcairn Islands	2002	52	0.0%	0
	Solomon Islands	1999	409 042	0.0%	0
	Tokelau	1999	1 562	0.1% <sup>b</sup>	2
	<b>Total Non-endemic</b>		<b>649 714</b>		<b>32</b>
Partially endemic	Marshall Islands	2001	52 664	0.1%	52
	Federated States of Micronesia	2000	107 008	0.2%	214
	New Caledonia	2004	236 900	0.5%	1 185
	Palau	2001	19 522	0.4%	78
	Wallis and Futuna	2001	14 988	0.7%	105
	<b>Total Partially endemic</b>		<b>431 082</b>		<b>1 634</b>
Endemic	American Samoa	1999	55 964	16.5%	9 234
	Cook Islands	1999	18 821	8.6%	1 619
	Fiji	2001	813 154	16.6%	134 984
	French Polynesia	2000	239 160	13.8%	33 004
	Kiribati	2000	84 494	1.7%	1 436
	Niue	1999	1 913	3.1%	59
	Papua New Guinea	2002	5 442 686	6.0% <sup>c</sup>	326 561
	Samoa	1999	172 717	4.5%	7 772
	Tonga	2000	98 042	2.7%	2 647
	Tuvalu	1999	9 503	22.3%	2 119
	Vanuatu	1998	180 854	4.8%	8 681
	<b>Total Endemic</b>		<b>7 117 308</b>		<b>528 116</b>
<b>TOTAL</b>			<b>8 198 104</b>	<b>6.5%</b>	<b>529 782</b>

<sup>a</sup> 1 non-endemic positive found, out of 328 tested.<sup>b</sup> 1 immigrant positive found, out of 1,311 tested.<sup>c</sup> Estimated from Papua New Guinea's application to PacELF.

baseline survey was its very first survey for filariasis. The rest are known to have had filariasis previously. Solomon Islands is the only non-endemic Melanesian country. The six non-endemic countries are not doing MDA but have received PacELF support or baseline blood surveys. Tokelau surveyed its whole population and conclusively showed that filariasis is no longer present. The non-endemic countries participate in PacELF meetings and cooperate fully with the other countries.

Of the nearly 8.2 million people in the PacELF countries (table 4-1), the great majority (7.1 million, or 87%) live in endemic countries and are exposed to the risk of filariasis. According to the population data in Table 4-1 and the baseline prevalence surveys at the start

Figure 4-1: Endemic, partially endemic, and non-endemic countries in the Pacific



of PacELF roughly 529 782 people in the Pacific, or 6.5% of the population, were infected.

The whole country is the MDA implementation unit for the endemic member countries except Papua New

Source: SPC and PacELF

Table 4-2: Partially endemic countries

Country	Known Endemic Area		Total Population		
	Area	Antigen Prevalence (%)	Population	Number	Year
Federated States of Micronesia	Satawal island	34.2	507	107 008	2000
Marshall Islands	Meijit island Ailuk island	44.2 29.1	416 513	50 840	1999
Palau	Ngardmau village	2.3	221	19 129	2000
Wallis and Futuna	Wallis island	1.0	9528	14 944	2003
New Caledonia *	Ouvéa island Maré island	1.5 2.6	3974 6896	196 836	1996

\* Personal communication

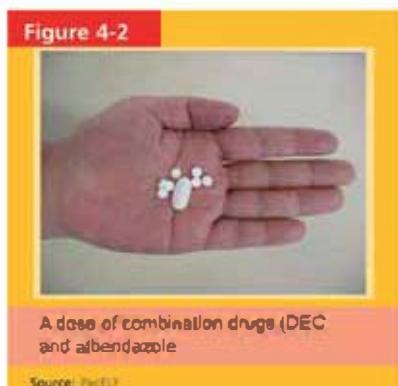
Island in the Federated States of Micronesia had 34.2% prevalence when tested in 2001. In the Federated States of Micronesia and the Marshall Islands, everyone living in known endemic islands or villages was treated, while in Palau, all positive cases were chosen for treatment. Wallis and Futuna, as mentioned above, decided to treat the whole country even though only Wallis Island is endemic.

## MASS DRUG ADMINISTRATION

Eleven endemic PacELF countries and one partially endemic country are carrying out MDA with DEC and albendazole (Figure 4-2) to eliminate filariasis. The countries are now (2005) in different stages of implementation (Table 4-3).

MDA implementation starts when a country submits its application to PacELF for the release of albendazole and DEC. As shown in Table 4-3, eight of the endemic countries submitted their first application in 1999, and one country (Samoa) started MDA that same year. Tokelau, a non-endemic country, also submitted an application in 1999 before deciding MDA was not necessary. Three more endemic countries submitted applications in 2000, two in 2001, and the last country (Papua New Guinea) in 2004.

Samoa has a long history of conducting mass drug administration to control filariasis (see Part 2), and was able to build on this experience to lead the way for PacELF and the world in the filariasis elimination campaign. Four other PacELF countries (Cook Islands, French Polynesia, Niue, and Vanuatu) followed close behind, in 2000. For logistical reasons, American Samoa did not complete MDA in 2000, but started and completed MDA in 2001. Also in 2001, Kiribati, Tonga, and Tuvalu began their MDA programmes. Fiji and Wallis and Futuna joined in 2002, and Papua New Guinea in 2005.



A dose of combination drugs (DEC and albendazole)

Source: PacELF

Guinea, where provinces are the implementation units. Wallis and Futuna, though only partially endemic, also decided to implement nationwide MDA. Between 1999 and 2004, 1.76 million people in 10 endemic countries plus Wallis and Futuna participated in MDA. Including the 4.4 million living in endemic provinces in Papua New Guinea, the total population targeted for MDA in the region is about 6.2 million in 12 countries. Since five annual treatments are needed, the actual target number of MDA treatments delivered will therefore be five times this number, or 31 million.

The partially endemic countries account for about 0.3% of the estimated number of filariasis cases in the region (Table 4-1). Details of known prevalence areas in these countries are given in Table 4-2. A few isolated islands and villages have high prevalence. Satawal



**Table 4-3: PacELF countries Implementing MDA, 1999 – 2010\***

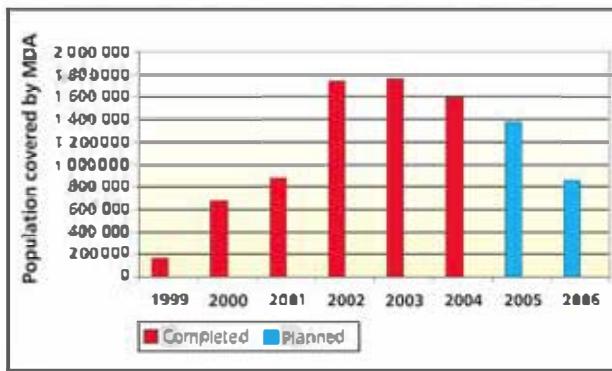
Year	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010
Wallis and Futuna												
American Samoa												
Cook Islands												
French Polynesia												
Kiribati												
Niue												
Samoa												
Tonga												
Tuvalu												
Vanuatu												
Fiji												
Papua New Guinea												
Number of Countries Implementing MDA	1	6	9	11	11	10	8	3	1	1	1	1
Number of People Targeted for MDA	172 717	680 837	886 722	1 737 211	1 759 130	1 597 849						

\* Cells shaded green are completed MDA and cells shaded blue are future MDA.

The MDA programme in each country must be completed in a short period of time (two months) to be most effective in reducing filariasis transmission. Each country fitted MDA into its schedule and chose which month of the year to implement it. In 2000, Niue started MDA in February, French Polynesia in March, Cook Islands in May, and Vanuatu in June. The number of countries implementing MDA reached a peak in 2002 and 2003, when 11 countries were doing MDA in each year (Table 4-3). After that, the number of MDA programmes started to decrease as countries finished their activities. By the end of 2004, five countries (Cook Islands, French Polynesia, Niue, Samoa, and Vanuatu) had completed five rounds of MDA, and four other countries (American Samoa, Kiribati, Tonga, and Tuvalu) had completed four rounds. Of the remaining countries, all except Papua New Guinea will have completed five rounds by the end of

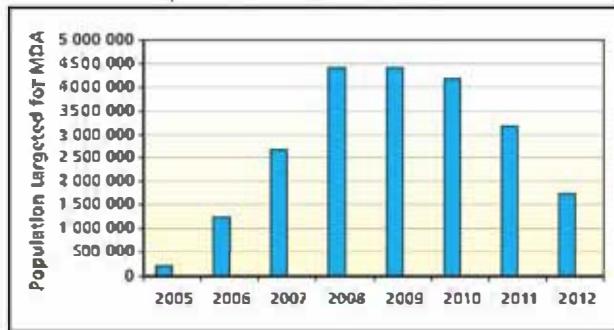
2006. Papua New Guinea will complete its MDA programme in 2012.

The population targeted for MDA each year in the Pacific countries (excluding Papua New Guinea) rose rapidly from less than 200,000 in 1999 to a peak of almost 1.8 million in 2003 (Figure 4-3). From this point the number of people participating in MDA started to decrease and will reach zero in 2007 unless some countries decide to continue beyond five years.

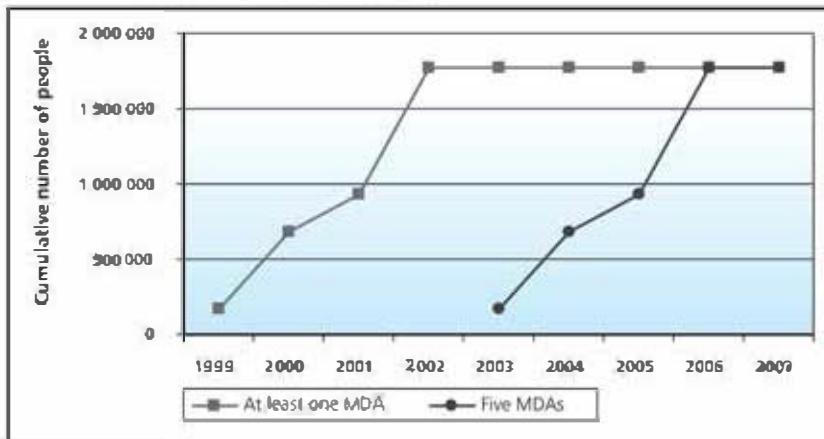
**Figure 4-3: Number of people targeted for MDA, 1999–2006\***

\*Excluding Papua New Guinea

**Figure 4.4:** Projected number of people participating in MDA in Papua New Guinea, 2005-2012



**Figure 4.5:** Cumulative number of people receiving MDA treatment in the PacELF countries.\* 1999-2007



\*Excluding Papua New Guinea

The planned number of people to be covered in Papua New Guinea is shown in Figure 4.4. The country will start its programme in 2005 in one province with a target population of 220 392, and will reach a peak target population of 4.4 million in 2008 and 2009, when all 16 endemic provinces will be doing MDA. In 2012, the last year of MDA implementation in the country, about 1.7 million people in five provinces will receive their last round of treatment.

The target of PacELF is to deliver five MDA treatments to each person living in an endemic country. Treatments will total 9.3 million by 2006 and 31.4 million by 2012. By the end of 2001, all of the target number of 1.76 million people could have received at least one MDA treatment (Figure 4.5). To estimate the cumulative number of people receiving

five treatments means assuming that the same people receive treatment each year, since coverage is less than 100%. PacELF, by the end of 2004, was almost halfway to the target of delivering five MDA treatments to all the residents of 11 PacELF countries.

Organizing the MDA programme is a full-time job for country managers and takes much longer than the one- to two-month period when the drugs are delivered to the community. Other tasks include securing financial support, ordering supplies, pursuing advocacy, registering the population, developing and printing health promotion materials, packing and shipping supplies, and compiling data after the MDA. Where necessary, PacELF works with countries to develop annual plans. An annual plan for Fiji is shown in Table 4.4.



Table 4-4: Filariasis programme in Fiji, 2004

Task	Person/Team Responsible	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
<b>1. Policy coordination, management</b>													
a. Develop operational/logistic plan													
b. Coordination of national and international, NGOs													
c. Advocacy													
d. Financial/Logistics support													
<b>2. Registration booklets</b>													
a. Redesign and print of registration booklets													
<b>3. Medicine supplies</b>													
a. Stock taking at Fiji warehouse													
b. Population correction													
c. Packing of medical supplies, registration booklets,etc.													
e. Drug dispensers													
<b>4. IEC materials</b>													
a. Print (Posters, leaflets, pamphlets, calendar,etc.)													
b. Mass media (TV spots, radio, newspaper)													
c. Other materials (T-shirt, billboard, bags,etc.)													
d. Questionnaires (awareness, KAP,etc.)													
<b>5. Stationery preparation</b>													
<b>6. Training</b>													
a. Workshops for MDA 2004													
<b>7. MDA</b>													
a. Booths setting up													
b. Back-up team at each division													
c. Return of registration booklets													
<b>8. Post-MDA</b>													
a. Booklets calculation													
b. Interpretation and reporting													
c. Annual and drug re-application report (WHO)													
d. Plan for MDA 2004													
<b>Administration work</b>													
a. Filing system, stationery													
b. Arrangement of field work and extra work in MH (transport, meal allowance, accommodation,etc.)													
c. Planning and handling of MDA													

## DRUGS AND ICT TESTS DISTRIBUTED

The PacELF home office is responsible for distributing supplies, mostly ICT kits and drugs, to the countries. This logistically challenging task requires intensive planning, since items need to be ordered well in advance, but it has been efficiently carried out since 1999. Figures 4-6 and 4-7 show the number of tablets of albendazole (400 mg) and DEC (50 mg) distributed each year from 2000 to 2004. The tablets were not necessarily used in the same year they were shipped, since the shipments were made at least several months before the MDA.

It can be seen from Figures 4-6 and 4-7 that the drug shipments peaked in 2003, when almost 2 million albendazole

tablets and 40 million DEC tablets were sent out.

The drugs have to be divided into many smaller packages for individual islands and remote distribution points.

Figure 4-6: Albendazole tablets shipped to the countries, 2000-2004

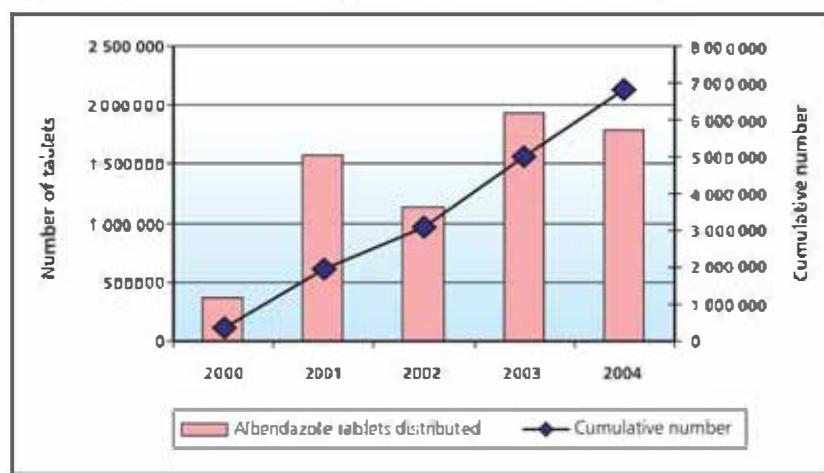


Figure 4-7: DEC tablets shipped to the countries, 2000–2004

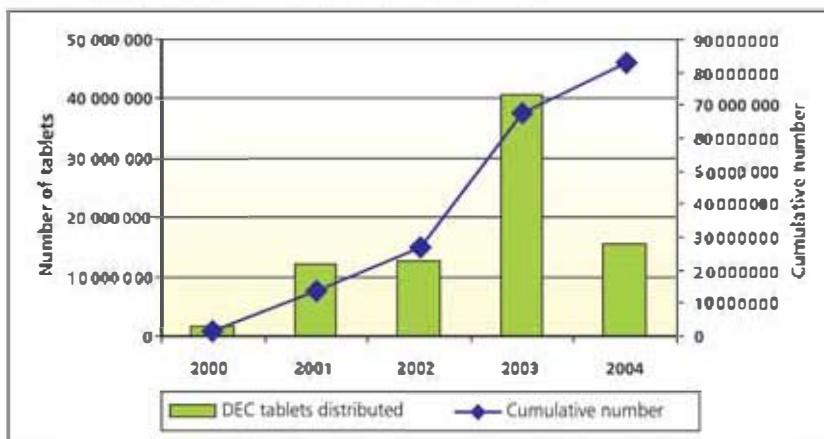
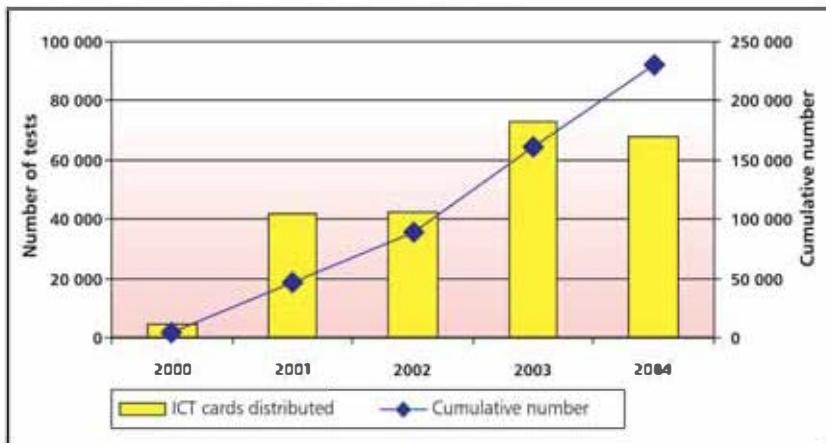


Figure 4-8: ICT kits shipped to the countries, 2000–2004



but opening the bottles in advance and dividing their contents would risk deterioration, especially for albendazole. Also, the average number of DEC tablets per person has had to be increased from the recommended six (in the GPELF guidelines) to eight, to allow for the large body size of many Pacific peoples. Hence, the shipments always overestimate projected requirements on purpose (by 20% in the case of albendazole). Some drug wastage is inevitable, although unused drugs are returned after the MDA.

Baseline filariasis prevalence is estimated with ICT kits, which also help in assessing progress in sentinel sites in the endemic countries, as well as in determining, during final evaluation surveys, whether the prevalence has dropped sufficiently after five years of

MDA. The number of ICT kits sent out by the PacELF home office is shown in Figure 4-8. Shipments of these kits also peaked in 2003; that year, 73,000 ICT kits were shipped to the countries.

## DRUG COVERAGE ACHIEVED

The logistical effort involved in organizing an MDA campaign cannot be overestimated. The campaign is equivalent in scope to a national census or election, since everyone must be contacted and registered. For that same reason, it differs from all other health campaigns that target only part of the population, such as immunization and maternal and child health programmes.

The coverage achieved has been generally good, considering the logistical problems presented by dispersed islands and remote populations. In most of the countries, the coverage is estimated from the detailed registration books that are returned to the national programme managers. This extremely time-consuming task occupies national staff for many weeks after an MDA is completed. Coverage estimates arrived at in this way are conservative estimates: if the registration books for an area are not returned, coverage is counted as zero. French Polynesia is the only PacELF country that has



Table 4-5: MDA coverage (%),† 9 –2004

Country	1999	2000	2001	2002	2003	2004
American Samoa		19.3	51.2	47.4	65.6	59.1
Cook Islands		77.9	77.1	100.3 <sup>a</sup>	91.1	92.1
Fiji				66.6	58.4	64.3
French Polynesia <sup>b</sup>		85.7	88.5	86.2	89.4	92.1
Kiribati			58.4	43.7	40.4	60.9
Niue		97.4	95.4	85.1	83.4	87.3
Samoa	84.5	52.4	67.4	59.6	77.9	
Tonga			79.1	83.6	90.3	85.2
Tuvalu			70.7	46.7	82.4	83.3
Vanuatu		80.4	78.8	76.6	77.8	73.6
Wallis and Futuna <sup>c</sup>				56.9	61.9	66.6
<b>Overall</b>	<b>84.5</b>	<b>69.9</b>	<b>75.3</b>	<b>69.1</b>	<b>68.7</b>	<b>71.2</b>

\* Based on reported coverage in registration books and yearly adjusted population estimates (Secretariat of the Pacific Community, Pacific Island Populations, 2004).

<sup>a</sup> Coverage figures for French Polynesia are extrapolated from coverage surveys.

<sup>b</sup> Wallis and Futuna is a partially endemic country but decided on nationwide MDA.

<sup>c</sup> Over 100% reported coverage in Cook Islands represents discrepancy between registered and census population estimates, possibly due to non-full-time residents receiving treatment.

routinely used separate coverage surveys.

Table 4-5 shows the reported coverage of MDAs in each country. All countries except four achieved higher than 70% coverage in at least one MDA, and some countries consistently achieved much higher rates than 70%. French Polynesia, Niue, Tonga and Tuvalu all had better than 80% coverage in three or more MDAs. The average coverage in the PacELF countries ranged from 59% to 75% (except in 1999, when only one country, Samoa, was doing MDA).

## HEALTH PROMOTION

A large number of health promotion materials were produced to support the programme in the Pacific countries. Chapter 3 contains some examples, and Part 2 shows the materials used in each country. An attractive logo was designed and used on all posters and reports. Some countries, especially the smaller ones, designed and produced materials with the help of the PacELF home office, while other countries went about the

task on their own. Information materials were produced in Bislama (Vanuatu), English, Fijian, French, Hindi (Fiji), Samoan, Tok Pisin (Papua New Guinea), and Tongan. Local names for the disease (such as waqaqa in Fiji) were used.

At the PacELF annual meetings, many countries were able to learn from one another. They exchanged ideas for posters and leaflets, which could be adapted for local use. T-shirts, stickers of various sizes and colours, and bags, were also favourite ways of displaying the PacELF logo and messages.

In the early stages of PacELF, many posters showed photos that focused on the possible damaging effects of filariasis morbidity, to capture people's attention and perhaps scare them into complying. For example, there were pictures of hydrocoele and limbs swollen by elephantiasis. In some cases, as in Vanuatu, this choice of strategy was based on the results of knowledge, attitude, and practice (KAP) surveys. As the programme matured, the health promotion materials changed to more positive messages. They

**Table 4-6: Health promotion materials produced for first MDA in Fiji, 2002**

Material	Target	Products
Posters	Public	Two kinds of A2-size posters in English, Fijian, and Hindi
Leaflet	Public, nurses	A4 size; in English, Fijian, and Hindi
Pamphlet	Public, nurses	A4 size; in English
Calendar	Public	A2 size; in English
Videotape	Public	PacELF videotape
TV advertisement	Public	
Radio spot	Public	FM 97 (6/day), Viti FM
Newspaper write-ups	Public	Articles in <i>The Daily Post</i>
Website	Public	Ministry of Health home page
T-shirt	Distribution staff	
Vehicle advertisements	Public	Advertisements on the Nasese bus (during MDA) and programme vehicles

**Figure 4-9**

A car with PacELF slogans

described what should be done to prevent filariasis and showed pictures of children and adults taking the MDA tablets.

Table 4-6 lists the IEC materials for the Fiji programme in 2002 (see Part 2). They include booklets, posters, leaflets, and pamphlets in three languages (English, Fijian, and Hindi)

and for diverse audiences including community members and health staff. Videos, TV advertisements, radio spots, and press releases were also produced. Finally, a calendar and T-shirts were produced and information was painted on the side of a bus and on programme vehicles (Figure 4-9).

The PacELF website was also a means of delivering information. It was launched in October 2002 and has had a steadily increasing impact since then. The number of hits to the site in 2004 is shown in Table 4-7. Considering the difficulties of Internet access in many Pacific island countries, it is encouraging to see that people from the Pacific Island countries make up quite a large proportion of those who access the site (Table 4-8).

**Table 4-7: PacELF website hit statistics, 2004**

Table 4-8: PacELF website hit statistics, by country, 2004

Top 30 Countries in April 2004				Top 30 Countries in August 2004			
No.	Country	Hits	%	No.	Country	Hits	%
1	Network	13 378	32.09	1	Unresolved/Unknown	6 856	29.38
2	Unresolved/Unknown	8 969	21.51	2	Network	4 932	21.13
3	Japan	4 017	9.63	3	US company	3 835	16.43
4	US company	3 903	9.36	4	Fiji	1 560	6.68
5	Fiji	1 642	3.94	5	Australia	1 359	5.82
6	French Polynesia	1 476	3.54	6	New Zealand (Aotearoa)	748	3.20
7	US school	1 431	3.43	7	Japan	388	1.66
8	United Kingdom	1 141	2.74	8	Netherlands	386	1.65
9	United States	1 022	2.45	9	US school	349	1.50
10	Canada	1 002	2.40	10	Non-profit Organization	345	1.48
11	Australia	643	1.54	11	United Kingdom	252	1.08
12	Netherlands	398	0.95	12	US Government	220	0.94
13	US Government	313	0.75	13	Switzerland	220	0.94
14	France	236	0.57	14	Brazil	209	0.90
15	India	183	0.44	15	Norway	169	0.72
16	Finland	171	0.41	16	Micronesia	163	0.70
17	New Zealand (Aotearoa)	171	0.41	17	Samoa	143	0.61
18	International	151	0.36	18	France	95	0.41
19	Switzerland	103	0.25	19	International	91	0.39
20	Samoa	97	0.23	20	India	77	0.33
21	Brazil	93	0.22	21	US Military	62	0.27
22	Poland	92	0.22	22	Niue	60	0.26
23	Philippines	86	0.21	23	Colombia	54	0.23
24	Non-profit Organization	82	0.20	24	Czech Republic	51	0.22
25	Spain	69	0.17	25	Vanuatu	51	0.22
26	Cook Islands	62	0.15	26	Poland	50	0.21
27	US Military	59	0.14	27	Old style Arpanet (arpa)	47	0.20
28	Israel	56	0.13	28	Austria	47	0.20
29	Papua New Guinea	54	0.13	29	Portugal	47	0.20
30	Germany	51	0.12	30	Belgium	46	0.20

## COSTS

PacELF's operations in the Pacific from 2001 through 2004 were examined to determine the economic cost of MDA per person treated, and also to understand how funds were allocated among transportation, personnel, equipment, and supplies. Finally, plotting the allocation of costs in actual programme implementation allowed those areas that require the most resources to be identified.

As Figure 4-10 shows, most of the PacELF budget goes to supplies and staff salaries. Supplies include (but are not limited to) drugs and surveillance materials, as well as office overhead. Personnel cost covers not only

permanent staff but also all hired consultants. Economic costs include all donated materials.

Generally, expenses vary little from one year to the next. Supplies constitute

Figure 4-10: Distribution of financial costs, 2001–2004

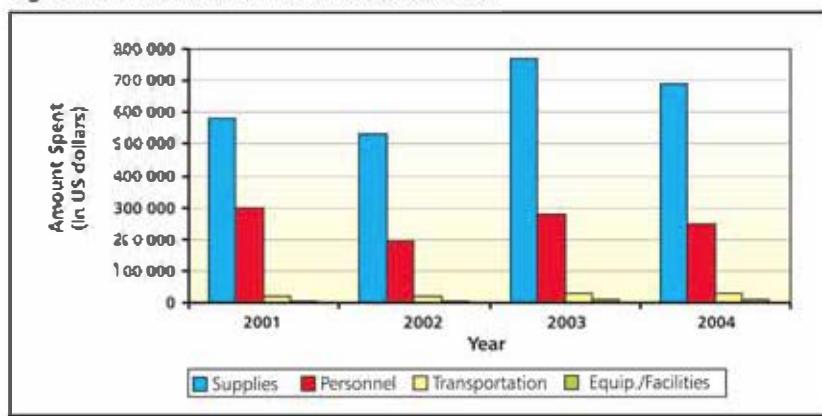


Figure 4-11: Distribution of implementation costs, 2001–2004

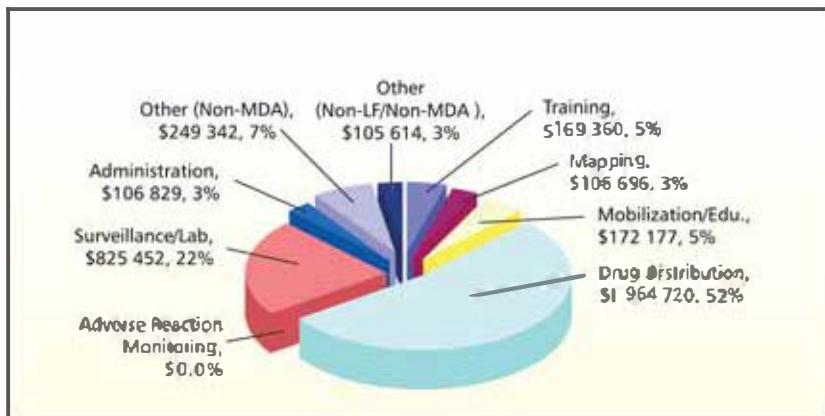


Table 4-9: Demographic Information and fiscal operating costs per year, 2001–2004

Year	Persons at Risk	Coverage (%)	Persons Treated	Total Cost (MDA Implementation) (\$)	Average Cost per Person Treated (\$)	Average Cost per Person at Risk (\$)
2001	1 737 211	75	1 308 120	805 111	0.62	0.46
2002	1 759 130	69	1 215 425	673 650	0.55	0.38
2003	1 818 241	69	1 249 131	986 287	0.79	0.54
2004	2 833 995	71	2 017 804	882 948	0.44	0.31
<b>Total</b>	<b>8 148 577</b>		<b>5 790 615</b>	<b>3 347 998</b>	<b>0.58</b>	<b>0.41</b>

about 70% of the total budget, and personnel costs account for 27%. Transportation and equipment expenses are minimal in comparison.

MDA programme implementation can be divided into several categories of activity. Figure 4-11 gives a breakdown of expenses by category. As can be seen from the chart, most of the resources are allocated for drug distribution (52%) and surveillance and laboratory activities (22%), with very little variation between years.

The cost per person treated was calculated from the total costs of MDA-related activity, using the MDA coverage rates and the number of people at risk (see Chapter 2). Table 4-9 shows that it cost between \$0.44 and \$0.79 to treat one person in 2001–2004, for an average cost of \$0.58 per person treated.

This analysis does not take into account the monies spent on MDA by individual countries in the Pacific, and therefore slightly underestimates the total cost of treating and preventing lymphatic filariasis. But the low cost per person is positive and encouraging. The cost analysis shows that PacELF is sustainable; the results may also be extrapolated to provide a rough estimate of the cost of other programmes that are scaling MDA.

## ACHIEVEMENTS

### IMPACT ON FILARIASIS

#### Methods of assessment

PacELF's goal is to rid the Pacific Island countries of lymphatic filariasis. In order to know when the disease has been eliminated, surveys of predefined indicators must be conducted. The main indicators used in PacELF are the prevalence of current infections and the incidence of new infections. Another important indicator is the amount of morbidity due to filariasis.

In the Pacific, the number of people with symptoms of filariasis disease

(elephantiasis, hydrocoele, etc.) seems relatively low compared with the number in other endemic countries like India. The strategy of PacELF has been to stop new cases first, and then to reduce morbidity in those with symptoms. Suitable indicators for this aspect of the disease are being developed as attention turns more towards alleviating the suffering it causes.

In PacELF, prevalence is usually estimated using ICT, which detects antigen from adult worms circulating in the peripheral blood. Prevalence can also be measured using blood slides to



estimate the number of people with microfilaria in the blood. From the blood slide, one can also assess impact by the reduction in the mean density of microfilariae in the blood.

The ICT overestimates by about two to four times the proportion of people with microfilariae, compared with the blood slide method. This is because ICT will detect the antigen in recently infected people who have immature adult worms but no Mf. The antigen from dead or dying adult worms may also persist in the blood for some time after successful treatment. In addition, people infected with only one single adult worm or with old adult worms past the reproductive age may test positive by ICT when no Mf are present in the blood. PacELF's aim is to reduce the prevalence of ICT positives down to less than 1%, which would correspond to a real microfilaria prevalence of 0.3% to 0.5%.

The relative performance of the two types of test (ICT and blood slide) was directly compared during the baseline surveys in Vanuatu and Samoa in 1998. The majority of people in both of these large surveys were tested by both methods. In Vanuatu, the overall prevalence was estimated at 4.8% by ICT and 2.8% by blood slide (Table 4-10), while in Samoa it was 4.2% by ICT and 1.1% by blood slide (Table 4-11). The different ratios between ICT and blood slide results in the two countries may reflect lower Mf densities in Samoa or other epidemiological differences.

Direct comparison of the two tests provided justification for PacELF's routine reliance on ICT for prevalence estimates. Only six individuals in Vanuatu, and none in Samoa, tested positive by slide and negative by ICT ("false negatives"). However, as expected, a large number of individuals tested negative by slide but positive by ICT, reflecting the different targets of the two tests. The positive predictive value of ICT compared with microscopy was

51.9% in Vanuatu and 25.4% in Samoa, while the negative predictive values were 99.8% and 100%, respectively. In other words, only about one-fourth to one-half of the people who test positive by ICT actually have Mf (although they may have adult worms and so are not true "false positives"). On the other hand, someone who tests negative by ICT is very likely negative for Mf.

In addition to prevalence surveys, a second major way to assess the success of PacELF is to determine whether or not transmission of the disease has been interrupted. To determine whether new infections are still occurring, young children just entering school are tested. The aim is to reduce the rate of new infections (incidence) down to less than 1 per 1000 per five years.

In summary, regular blood surveys are scheduled in the PacELF countries to assess both prevalence and incidence. As described in Chapter 2, the monitoring and evaluation plan calls for four types of assessment surveys: a baseline prevalence survey ("A" survey), midterm evaluations conducted in sentinel sites after the second or third round of MDA ("B" surveys), a representative final evaluation prevalence survey after five years of MDA ("C" survey), and an incidence

Table 4-10: Comparison of ICT and blood slide (50ul) tests in Vanuatu, 1998

SLIDE	ICT		
	Positive	Negative	TOTAL
Positive	108	6	114
Negative	100	3360	3460
<b>TOTAL</b>	<b>208</b>	<b>3366</b>	<b>3574</b>

Table 4-11: Comparison of ICT and blood slide (50ul) tests in Samoa, 1998

SLIDE	ICT		
	Positive	Negative	TOTAL
Positive	43	0	43
Negative	126	3885	4011
<b>TOTAL</b>	<b>169</b>	<b>3885</b>	<b>4054</b>

Table 4-12: Number of surveys of each type, completed or planned according to the PacMAN book, 1999–2010

Year	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010
Initial assessment	7	2	11	3								
Midterm assessment		1	4	3	5	7	1	1				
Final assessment						3	2	5	4	1		
Transmission assessment				1		1	6	3	7	4	1	1
Number of countries and areas implementing monitoring and evaluation	7	3	15	7	5	11	9	9	11	5	1	1

Survey conducted among young children ("D" survey) at least two years after the MDAs. Table 4-12 shows the number of surveys completed or planned by PacELF.

Each country used the results of the baseline surveys to select several sentinel villages—usually villages where the prevalence is higher than average—to follow closely during the implementation of the programme. Follow-up surveys are done at intervals in these sentinel sites. The PacMAN book recommends a mid-term evaluation after two or three rounds of MDA, but some countries did follow-up surveys in sentinel sites after every round.

### Decline in prevalence

This section describes the impact of MDA, analyses country data, and makes a comparison between

consecutive surveys. First, it describes the change in prevalence, as measured between initial (as part of baseline) surveys and follow-up surveys in selected sentinel sites during the MDA activities. Then, it gives the results for the change between the baseline (A) assessment and the final assessment (C) surveys among the entire population.

Nine of the 11 countries conducting MDA have completed at least one follow-up survey in sentinel sites (Table 4-13). Two countries (Samoa and Niue) have also completed a final (C) assessment after five rounds of MDA.

A decrease in iCT prevalence was observed between the initial and follow-up surveys in sentinel sites in all but one country. After one round of MDA in three countries (American Samoa, Cook Islands, and Niue) the percentage

Table 4-13: Prevalence percentage by iCT initial (before MDA) and follow-up (after MDA) surveys in selected sentinel sites

Country	Prevalence before MDA			Prevalence after MDA			Prevalence before MDA			Prevalence after MDA		
	Examined	Positives	% Positives	Examined	Positives	% Positives	Examined	Positives	% Positives	Examined	Positives	% Positives
American Samoa	350	61	17.4	602	64	10.6						
Cook Islands	1396	131	9.4	460	35	7.6						
Niue	1794	56	3.1	1507	22	1.5						
French Polynesia	1859	256	13.8	1855	276	14.9						
Vanuatu	627	151	24.1				1171	92	7.9			
Fiji*	234	90	38.5							345	78	27.6
Samoa	1943	129	6.6							2141	96	4.5
Tonga**	4002	108	2.7							3896	96	2.5
Tuvalu	574	128	22.3							3800	483	12.7

\* Fiji post survey was carried out in Feb 2005.

\*\* In Tonga a slightly different selection of villages (on the same islands) was surveyed at follow-up.

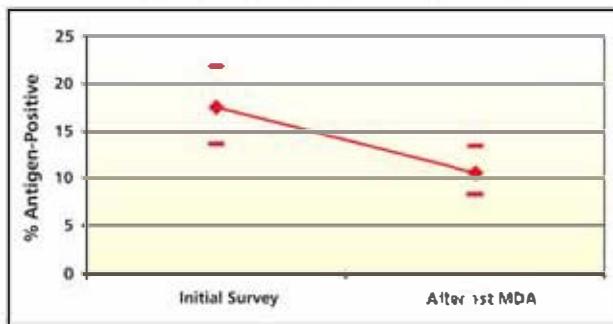


decline in prevalence ranged from 19% in Cook Islands to 52% in Niue (Figures 4-12, 4-13, and 4-14). In French Polynesia, the prevalence was unchanged after one round of MDA (Figure 4-15). After two rounds of MDA in Vanuatu, ICT prevalence had declined by 67% (Figure 4-16). After three rounds of MDA in four other countries (Fiji, Samoa, Tonga, and Tuvalu), the decline

ranged from 7% in Tonga to 43% in Tuvalu (Figures 4-17 to 4-20). The graphs suggest that, in general, the higher the baseline prevalence, the steeper the decline between the initial and follow-up surveys.

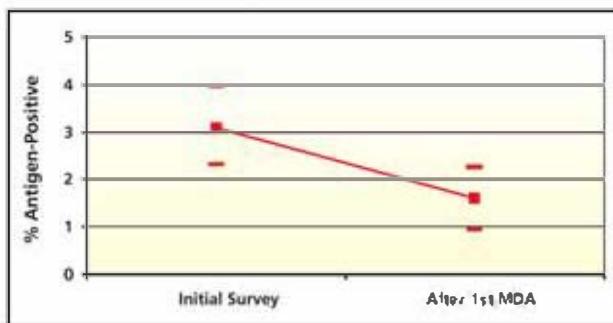
As mentioned, two countries (Samoa and Niue) have completed the final assessment (C) survey, in 2004. The C assessment is a nationwide

**Figure 4-12:** Antigen prevalence in sentinel sites in American Samoa at initial survey after one round of MDA\*



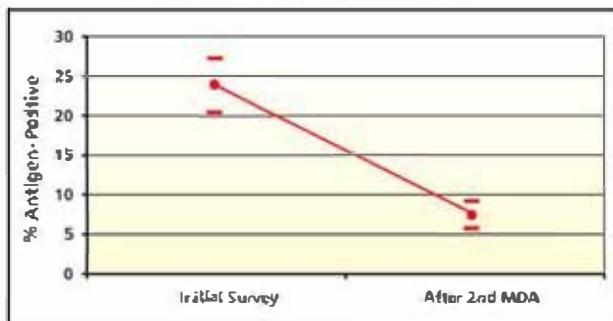
\* Bars represent 95% confidence intervals

**Figure 4-14:** Antigen prevalence in sentinel sites in Niue at initial survey after one round of MDA\*



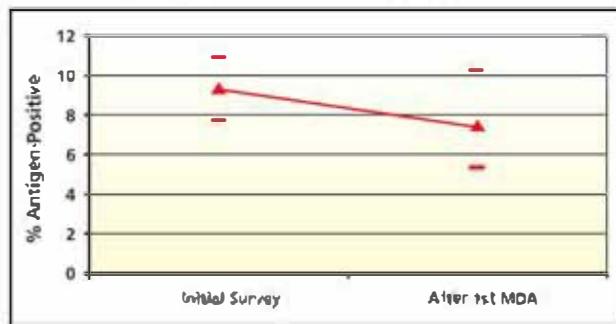
\* Bars represent 95% confidence intervals

**Figure 4-16:** Antigen prevalence in sentinel sites in Vanuatu at initial survey after two round of MDA\*



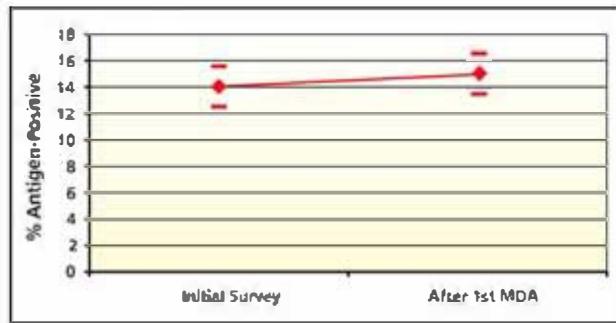
\* Bars represent 95% confidence intervals

**Figure 4-13:** Antigen prevalence in sentinel sites in Cook Islands at initial survey after one round of MDA\*



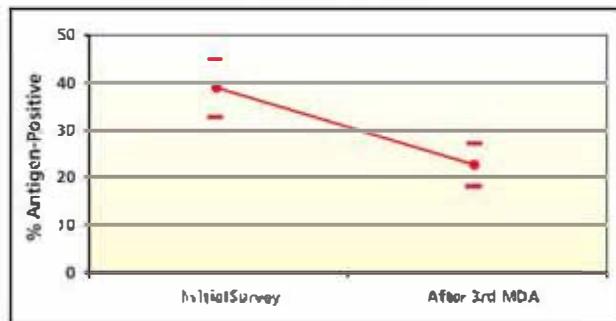
\* Bars represent 95% confidence intervals

**Figure 4-15:** Antigen prevalence in sentinel sites in French Polynesia at initial survey after one round of MDA\*



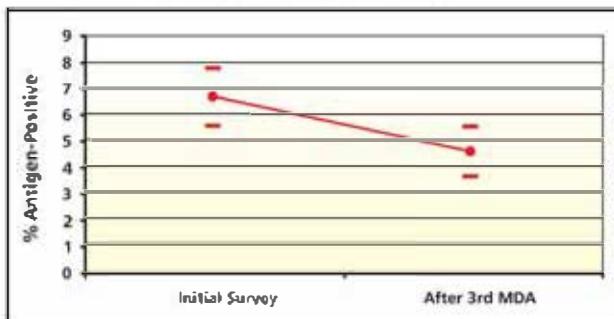
\* Bars represent 95% confidence intervals

**Figure 4-17:** Antigen prevalence in sentinel sites in Fiji at initial survey after three round of MDA\*



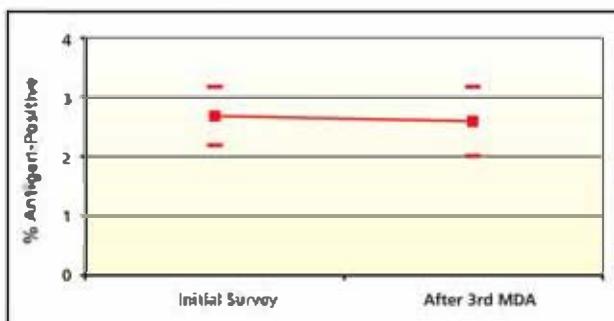
\* Bars represent 95% confidence intervals

**Figure 4-18: Antigen prevalence in sentinel sites in Samoa at initial survey after three round of MDA\***



\* Bars represent 95% confidence intervals

**Figure 4-19: Antigen prevalence in sentinel sites in Tonga at initial survey after three round of MDA\***

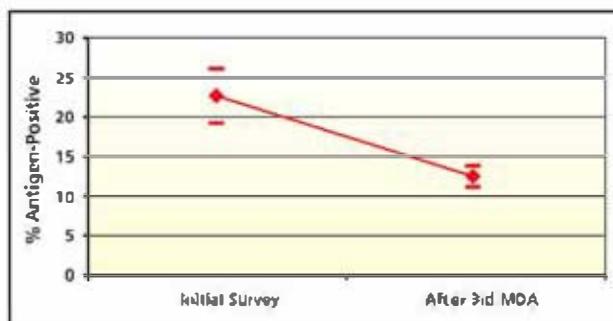


\* Bars represent 95% confidence intervals

survey, and thus the results can be compared with the baseline (A) assessment. In both countries a dramatic decline in prevalence was seen between the two surveys (Table 4-14). In Niue, the prevalence by ICT was reduced from 3.1% to 0.2%, or by 94% (Figure 4-21) In Samoa, the decline in prevalence by ICT was from 4.5% to 1.1%, or by 76% (Figure 4-22).

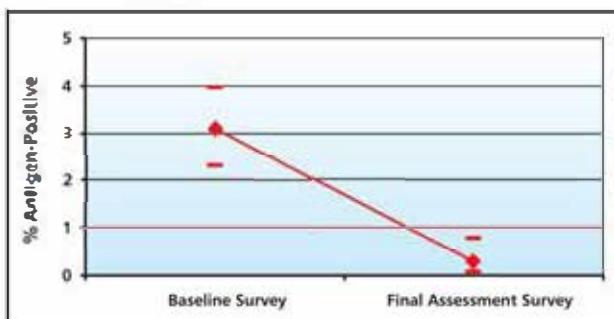
Thus, five rounds of MDA reduced prevalence in Niue and Samoa by an average of 85%. Niue started with a lower prevalence than Samoa, and brought it down well below the target of 1%. In Samoa, the estimated prevalence at the

**Figure 4-20: Antigen prevalence in sentinel sites in Tuvalu at initial survey after three round of MDA\***



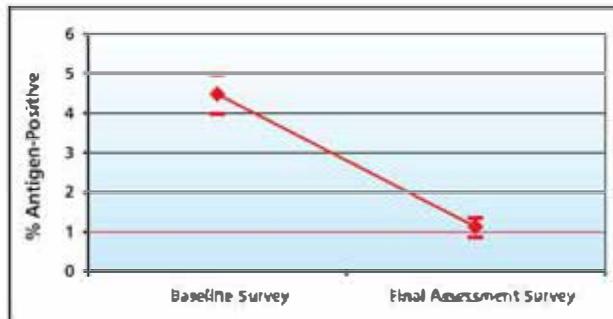
\* Bars represent 95% confidence intervals

**Figure 4-21: Reduction in antigen prevalence in Niue between baseline (A) and final (C) assessment after five rounds of MDA\***



\* Bars represent 95% confidence intervals

**Figure 4-22: Reduction in antigen prevalence in Samoa between baseline (A) and final (C) assessment after five rounds of MDA\***



\* Bars represent 95% confidence intervals

**Table 4-14: Prevalence percentage by ICT of baseline A assessment and final C assessment in Niue and Samoa (countrywide survey)**

Country	A survey			C survey			% difference
	Number examined	Number positive	% positive	Number examined	Number positive	% positive	
Niue	1794	56	3.1	1285	3	0.2	94
Samoa	7006	317	4.5	12 719	144	1.1	76



**Table 4-15:** Reduction in Mf density between Initial survey and subsequent surveys in Samoa and Vanuatu  
(Geometric mean Mf per 60 µl)

Country	Type of survey	1998 Initial survey			2002* Follow up survey			2004 Final survey		
		ICT%	Mf%	MfD	ICT%	Mf%	MfD	ICT%	Mf%	MfD
Samoa	Nationwide	4.5	1.1	5.9				1.1	0.4	3.6
	Sentinel (2 villages**)	7.0	1.3	-	4.1	0.2	-	1.0	0.3	
Vanuatu	Nationwide	4.8	2.5	14.8	8.0	1.2	-			
	Sentinel (8 villages***)	24.1	12.0	17.0	7.9	0.8	3.0			

\*: Samoa - post 3rd MDA, Vanuatu - post 2nd MDA

\*\*: 2 villages - Sagone and Salimu

\*\*\*: 8 villages - Sola, Mosma, Port Resolution, South river, Sakau, Oraap, Unmele and Warui

final assessment was only slightly higher than the target 1% prevalence.

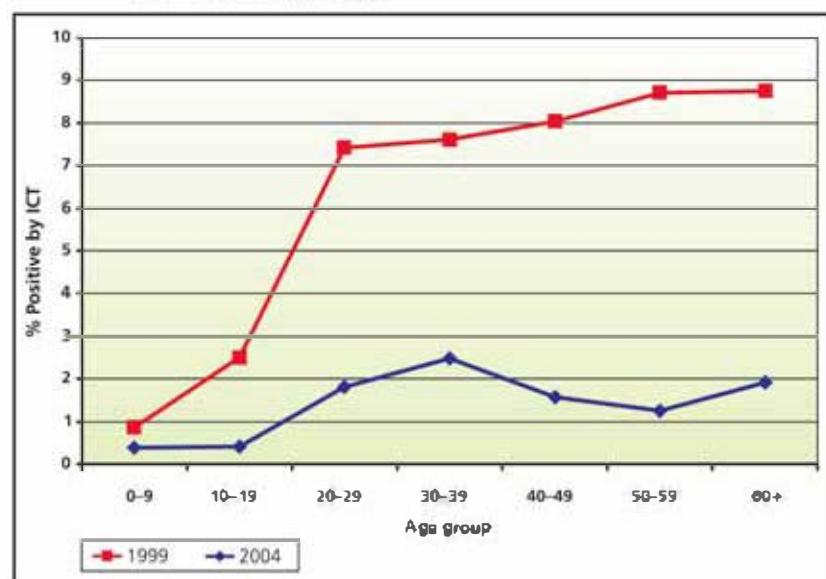
In Samoa, blood slides were prepared for persons who had tested positive by ICT, to determine Mf prevalence and density. The decline in Mf prevalence in Samoa from 1.1% in 1998 to 0.4% in 2004 paralleled the decline in antigen prevalence (Figure 4-22).

There was also a reduction in the density of microfilariae per 60 µl per person in two countries, Vanuatu and Samoa (Table 4-14). In Vanuatu the reduction was statistically significant. The geometric mean of Mf was 1.7 in 1998 and 3 after the second round of MDA ( $p=0.012$ ). In Samoa the density was much lower than in Vanuatu. It was 5.9 in 1998, before PacELF, and 3.6 in 2004, after five rounds of MDA ( $p=0.06$ ).

There was also a large change in the age-specific prevalence of ICT positives in Samoa, between the baseline and subsequent surveys. Figure 4-23 shows that the number of ICT positives had dropped in all age groups, but the decline was especially marked in people over the age of 20. In 1999, before PacELF started, the prevalence in the over-20 age group was 7%-10%. By the time of the final evaluation survey in 2004, all age groups had less than 3% positive by ICT.

The impressive reduction in filariasis prevalence in Niue and Samoa after five MDA rounds and the

**Figure 4-23:** Age-specific prevalence of ICT positives in Samoa at baseline survey in 1999 and final evaluation in 2004



encouraging results from midterm evaluations in another six countries show that PacELF is on the road to success in all the endemic countries. The reduction observed is presumably due both to effective treatment of cases and to reduction in transmission and, hence, prevention of new cases.

Niue and Samoa achieved an average reduction of 85% after five MDA rounds. At the start of this chapter, it was estimated that 500 000 people in the Pacific were infected with *W. bancrofti* at the start of PacELF. If the 85% reduction figure were to be applied to this infected population, at least 425 000 filariasis infections would have been treated or prevented by the end of

PacELF's MDA programmes. If 85% reduction is achieved, then the antigen prevalence in the Pacific region as a whole will be about 0.9%. Thus, there is every reason to expect that PacELF will succeed in its goal of reducing the antigen prevalence to below 1% in all countries by 2010.

### Increase in health knowledge

In Vanuatu, a social research study was done in 1999 as part of the process of planning for the MDA and designing health promotion materials.<sup>21</sup> At that time, most respondents were familiar with filariasis and its symptoms. However, most of them ascribed the symptoms to germs, lack of hygiene, bad nutrition, and the breaking of taboos. Good hygiene and nutrition practices were often cited as possible preventive measures, closely followed by mosquito control, kastom (local) remedies, and quarantine. Respondents were equally divided between kastom and Western treatments for the disease.

At a second survey in Vanuatu in 2002, after two rounds of MDA, 55% of the respondents said that mosquitoes were responsible for transmitting filariasis, but a quarter still did not know how the disease was transmitted. In addition, two-thirds of the respondents thought that "taking tablets" was the best way to prevent the spread of filariasis.

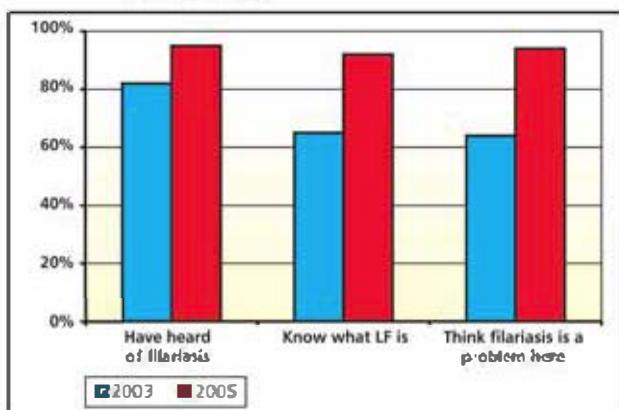
Only 14% mentioned using mosquito nets. Knowledge in this area is obviously still lacking. Concerning treatment, very few people mentioned kastom methods in this second survey and only about one third mentioned Western treatments. In particular, only a tiny proportion (1%) knew that affected areas of the body need to be kept clean. Thus, between the two surveys, there was an increase in knowledge about prevention but not about what to do when infected.

In two other countries (American Samoa and Fiji), surveys of knowledge, attitudes, and practices (KAP) shed light on the level of knowledge about filariasis in the population, and how it has changed over time. The responses to selected questions in the two countries are shown in Figures 4-24 and 4-25.

In American Samoa, MDA coverage in 2001 and 2002 was disappointingly low. The filariasis programme designed and implemented a KAP survey in 2003, several months before MDA. The programme used the survey to determine how social mobilization and distribution strategies could be improved. This survey revealed that 35% of the population did not know what filariasis was, and only 58% knew that mosquitoes can cause and spread the infection. Participation in MDA increased greatly from 2003 onwards, and in a second KAP survey in 2005, there was a marked increase in several aspects of knowledge about filariasis and the programme (Figure 4-24).

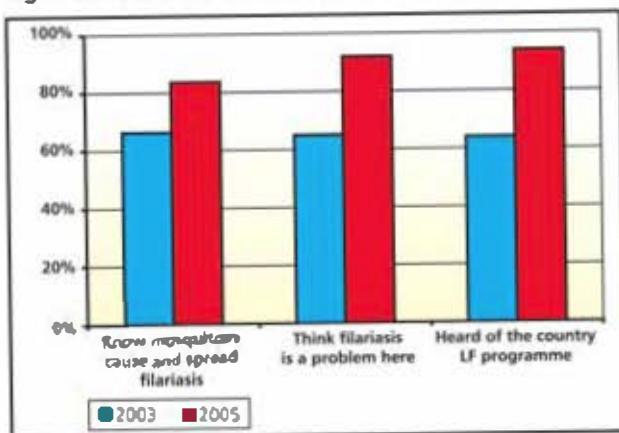
In Fiji, the baseline KAP study in 2002 showed that the level of knowledge about filariasis was quite good, even before PacELF (Figure 2-25). For example, two-thirds of the respondents said that mosquitoes transmitted filariasis, although 7.5% thought that "drinking dirty water" was the cause. Other responses such as "person-to-person contact" and "hygiene" were each given by less than 5% of the people asked. In

Figure 4-24: Results of KAP surveys in American Samoa, 2003 and 2005



<sup>21</sup> Chevalier (1999)



**Figure 4-25: Results of KAP surveys in Fiji, 2003 and 2005**

addition, even at that early stage of the Fiji campaign, the majority of the people (57%) knew that taking medicine could prevent the spread of filariasis and a further 32% mentioned mosquito control methods or nets for prevention.

At Fiji's second survey in 2005, the proportion that knew that mosquitoes transmitted filariasis had increased from 67% to 82% (Figure 4-25), and there were similar increases in other aspects of knowledge about the disease. However, the number of people who knew that taking medicine could prevent filariasis stayed the same (60%). A somewhat alarming percentage is the 12% who said that they did not take tablets in the last MDA and did not intend to take them in the future. These "systematic non-compliers" must be reached or else they may jeopardize the prospect of elimination.

In all three countries surveyed, the main reason given for taking the MDA tablets was "to protect myself from the disease", indicating that dealing with a personal threat was more important to people than reducing transmission to others. The main reason for not taking drugs was "missed the distribution" or "didn't know about the distribution", suggesting that coverage had decreased not because people refused to take the tablets but because of difficult logistics.

## IMPACT ON THE HEALTH SYSTEM

PacELF affected the health system in all countries. In some cases, the start of PacELF marked the first time that the extent of the disease was recognized. Even if filariasis was already known, the programme raised the profile of filariasis and forced the health system to consider how to ease the suffering caused by the disease. Other countries were glad to know that they no longer had to worry about new cases of filariasis, since the disease had already been eliminated in their territory.

Samoa, French Polynesia, and Fiji were the only countries with an established or dedicated filariasis control office or section in the ministry of health before PacELF began. In Fiji's case this was because of the filariasis research and control activities of Dr J. Malaika and his colleagues, while French Polynesia and Samoa both had long histories of MDA programmes (see Chapter 2). In Vanuatu, Solomon Islands, and Papua New Guinea, attention to malaria overshadowed other vector-borne diseases. In these countries, malaria control units were converted to "vector-borne disease control units" at about the time that PacELF began, reflecting a broader interest in

diseases other than malaria. In all PacELF countries, the neglected task of filariasis control became the clear responsibility of someone in the ministry or department of health.

Health system personnel were involved directly with PacELF in most countries. Nurses were always key people in drug distribution, but country programme managers and other staff were chosen by each country from a variety of health professions. Public health doctors were closely involved in the programme in Fiji and Tonga, health inspectors in the Cook Islands, laboratory staff in Tuvalu, and senior nurses in American Samoa.

Participating in PacELF's activities increased opportunities for health staff.

other than *W. bancrofti*, including intestinal helminths. Resources available for MDA enabled some health workers to visit remote islands and areas, where they could provide other services such as immunization and maternal and child health clinics.

The MDA was typically a time-limited, once-a-year campaign, occupying only a few days of the health workers' and nurses' time, although the workload during this period was intense. The extra work was offset by the additional knowledge gained by the health workers and the services they provided to the communities.

In Vanuatu (Figure 4-26), feedback on the MDA was sought from nurses in

Figure 4-26



MDA in Vanuatu

Source: Vanuatu Health Department

Aside from the networking and collaboration at PacELF annual meetings, they improved their computing, data management, and presentation skills. PacELF provided computers to seven countries, and promoted the use of email for communication. A few staff had the opportunity to travel overseas for specialized training.

The mass drug administration programmes ensured that everyone participating in the MDA was contacted in person by a health worker at least once a year during the programme. The drugs used in MDA reduced infections from helminths

2002. They said that not enough supplies (medicine, registration books, and health promotion materials) were delivered on time, and there were not enough funds for transport. The complaints reportedly increased as the programme progressed, and the nurses seemed unlikely to continue giving strong support to the programme beyond five years. But they indicated that the programme was generally run well.

Nurses in Fiji were asked to evaluate training workshops and health promotion materials in 2003. The great majority reported having received



**Table 4-16:** Possible effects of integration of filariasis control and other health programmes\*

Programme	Effect On:				
	Filarisis	Malaria	Dengue	Intestinal Worms	Nutritional Status
PacELF: MDA, Morbidity Control and Awareness Campaign	↓	↓	↓	↓	↑
Healthy Schools Programme	↓			↓	↑
Malaria Control Programmes	↓	↓	↓		
Dengue Control Programmes	↓		↓		
Environmental Health Improvement	↓	↓	↓	↓	↑

\* Down arrow represents a decrease in the problem shown in column heading; up arrow represents an increase.

enough "informative" or "very informative" materials for the 2003 MDA campaign. Slightly fewer (about two-thirds) had seen, heard, or read information through the various mass media, but these expressed a strong preference for TV and radios over than newspaper articles as a means of disseminating information. The nurses also felt that the training, while useful, fell short of what they needed to know in order to treat infected people.

The PacELF programme lends itself very well to integration with other health programmes such as vector control and helminth control in children, in support of the concept of "Healthy Islands" (Table 4-16).<sup>22</sup> In Vanuatu and Papua New Guinea, where both filariasis and malaria are transmitted by *Anopheles* mosquitoes, the use of mosquito nets to help prevent both diseases is being promoted. Even in Fiji and the Polynesian countries, insecticide-treated materials are now being tested by PacELF, and may protect against dengue as well.

sufferers often withdraw from social interaction. Non-biomedical explanations of causality often attach blame to the victim. In Vanuatu many respondents in the first KAP study in 1999 mentioned "breaking taboos" or exposure to female menstrual pollution as causes. As the biomedical explanations for filariasis are publicized and more people come to believe that it is a disease that is mosquito-borne and not self-inflicted, this will affect how patients and other people perceive the condition.

Stigma and shame are inevitably associated with the pathology of elephantiasis and hydrocoele. The publicity engendered by the MDA programmes in PacELF endemic countries may reduce this stigma, but could also direct an unwelcome spotlight on sufferers. Care must be taken to avoid negative connotations of positive status in blood surveys. The stigma must be overcome, to encourage patients to come forward and participate in morbidity reduction programmes.

Filariasis elimination in the Pacific was clearly brought onto the regional political agenda when it was endorsed by the Pacific island health ministers at their meeting in Palau in 1999 (see Chapter 2). At subsequent meetings, the health ministers reiterated their support for PacELF. The "Madang

## SOCIAL AND POLITICAL IMPACT

Increased attention to filariasis is bound to have an impact on society. Filariasis is a disfiguring disease, and

<sup>22</sup> WHO (2001)

**Commitment towards Healthy Islands**<sup>23</sup> produced after the health ministers' meeting in Madang, Papua New Guinea, in 2001 stated that:

*substantial progress made by countries and areas in the elimination of filariasis was recognized. It was also observed that countries were keen to extend/expand PacELF activities in all territories.*

The work of PacELF has been supported by many organizations since 1999. The Government of Fiji has provided office and storage space and transport. The office of the WHO Western Pacific Region in the South Pacific has provided full-time staff (the project director and three coordinators in Fiji, Samoa, and Vanuatu) and funds for annual meetings. Filariasis elimination and PacELF have had a high profile in the Western Pacific Region since 1999. A resolution passed by the WHO regional committee in 2002 stated in part that the committee:

*Further recognizing that the countries of the Pacific have joined together to form the Pacific Programme to Eliminate Lymphatic Filariasis (PacELF)...*

*Urge member states...*

*...to mobilize communities to take an active part in ensuring high levels of coverage with mass drug distribution campaigns for the elimination of lymphatic filariasis and other helminthoses.<sup>24</sup>*

PacELF was also prominently mentioned in the WHO Regional Director's report for 2001–2002 and 2002–2003.

The Global Alliance to Eliminate Lymphatic Filariasis has taken notice

of PacELF's activities and enthusiastically endorsed its plans at Global Technical Advisory Group meetings.<sup>25</sup> Private partnerships in the Global Alliance and PacELF are represented by GSK, a staunch supporter of PacELF from the start. GlaxoSmithKline donates all the albendazole used worldwide for filariasis elimination. A team from GSK visited PacELF in March 2001 before committing wholeheartedly to support the Pacific countries through the PacELF regional system.

The Japanese Government supports PacELF in many ways, including the donation of supplies and support of Japanese Overseas Cooperation volunteers through JICA. Reflecting the huge amount of support given to PacELF by the Government of Japan, PacELF has been the subject of a Japanese white paper that indicates that the Government views PacELF as a shining example of a successful aid programme.

PacELF has greatly increased the amount of contact and networking between health staff in different Pacific Island countries. Country staff are able to meet at least once a year at the PacELF meetings and compare notes on their progress. Networking and communication through meetings, email, and the PacELF website (see Chapter 3) have contributed to a cooperative spirit and shared interests among the countries as they unite to fight filariasis.

The PacELF countries have been learning and collaborating together for the last six years to greatly reduce the number of cases of filariasis in the region, and justifiably take great pride in this achievement. This pride will be clearly apparent when the Fiji Minister of Health, representing all the Pacific Island countries, invites the international

<sup>23</sup> Madang Commitment towards Healthy Islands, March 2001, WPR/ECP/DPM/2001.  
<sup>24</sup> WHO (2002).  
<sup>25</sup> WHO (2004).



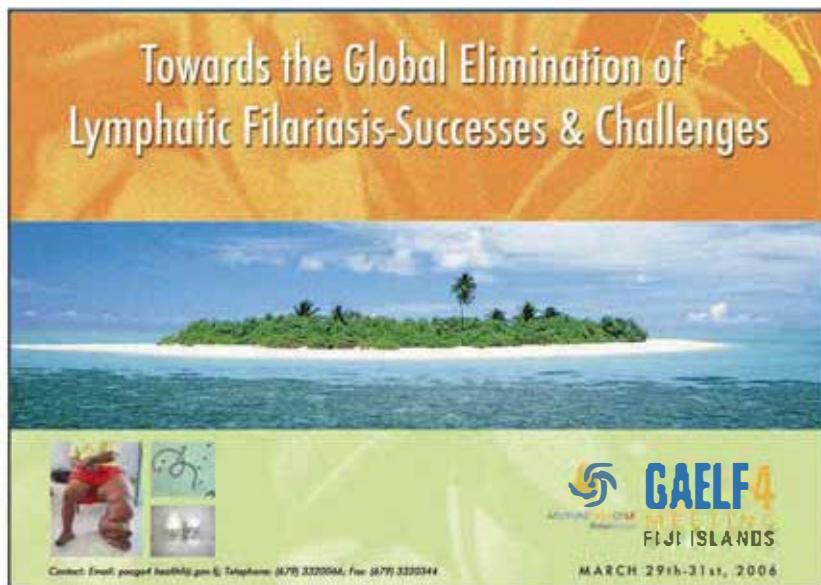
filariasis community to Nadi, Fiji, for the fourth meeting of the Global Alliance to Eliminate Lymphatic Filariasis in March 2006 (Figure 4-27).

During the meeting of the Pacific ministers of health in Apia, Samoa, in

March 2005, the Minister of Health of Fiji stated:

*I warmly invite all the Pacific Island Ministers for Health to the GAELF 4 to celebrate the Pacific success in this elimination initiative.*

Figure 4-27: Proposed poster of the Fourth Global Alliance Meeting in Fiji, 2006



# Success and Challenges



## HIGHLIGHTS

One of the first achievements of PacELF was to provide updated, thorough knowledge of the true distribution of filariasis in the Pacific, through baseline surveys in the member countries. The availability of the ICT test for filarial antigen helped; it provided an immediate result and could be done anytime during the day or night. In areas with nocturnally periodic filariasis, the baseline surveys revealed that filariasis was still being transmitted in 16 of the 22 Pacific Island countries and territories. In five of these 16, filariasis had a prevalence of less than 1% and was therefore considered partially endemic. But in this same group of five, three countries (the Federated States of Micronesia, the Marshall Islands, and Palau) and the territory of New Caledonia reported prevalence of more than 1% (and sometimes much higher) in relatively small isolated areas. In Wallis and Futuna, filariasis was present only on Wallis Island.

In 11 countries, prevalence was more than 1% and was considered endemic. The baseline surveys found prevalence to be highest in Tuvalu, with 22% positive by ICT. American Samoa,

Cook Islands, Fiji, French Polynesia, and Papua New Guinea also reported prevalence above 5% by ICT. The disease is most endemic in Polynesia and Melanesia, where *Ae. polynesiensis* and *Anopheles* are primary vectors.

The first goal of PacELF is to reduce the prevalence of the filarial antigen to less than 1% in all of the PacELF countries. Eleven countries where the disease is endemic chose the strategy of mass drug administration with DEC and albendazole once a year for at least five years. Wallis and Futuna also decided to do nationwide MDA. The other countries where filariasis is only partially endemic decided to treat positive cases or do mass treatment in limited areas. Sentinel sites for monitoring progress were selected in each country, except for countries like Niue, where the population was small enough to allow everyone to be surveyed.

From the start, PacELF was a collaboration between national governments, WHO, and donors. The government of each country, particularly the health ministry, was asked to nominate a focal person who would be

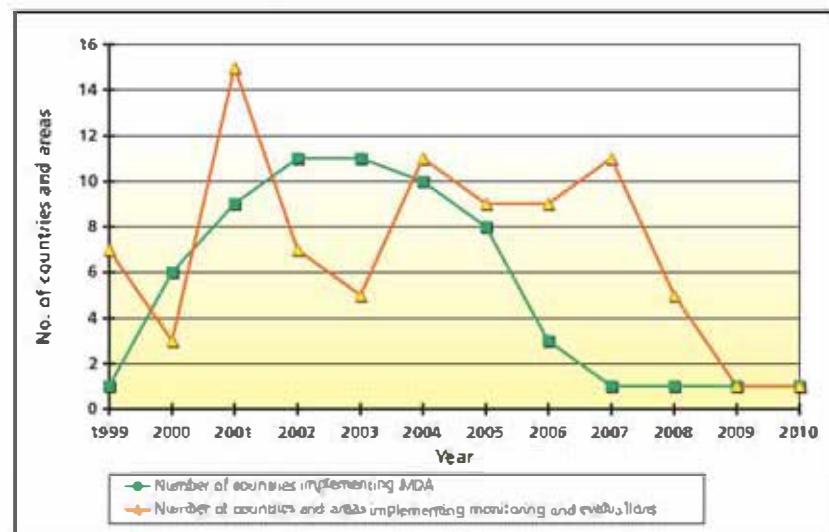


responsible for filariasis. Plans of action were then prepared for the baseline surveys and the MDAs. All countries in the region committed to PacELF at the inaugural meeting in 1999. Countries doing MDA then officially started the process by submitting a formal application for albendazole tablets. Eight countries and territories where the disease is endemic (American Samoa, Cook Islands, Fiji, Niue, Samoa, Tokelau, Tonga, and Vanuatu) applied in 1999, and three others (the Federated States of Micronesia, French Polynesia, and Kiribati) did so in 2000. Tuvalu and Wallis and Futuna submitted their applications in 2001, and Papua New Guinea applied in 2004.

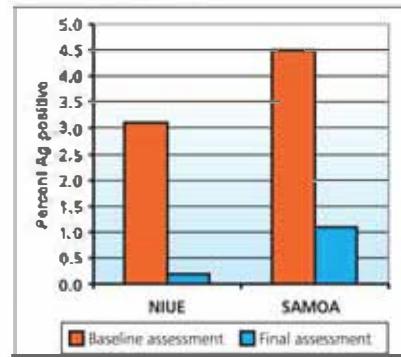
The MDA programmes started quickly, first in Samoa in 1999, then in five more countries the next year (Figure 5-1). By 2005, all countries that chose the strategy had started MDA. MDA coverage was generally good, averaging 69% to 75% overall. Midterm evaluations began in 2002 in some countries, and will continue. Two countries (Niue and Samoa) have done final evaluation surveys. Prevalence is assessed primarily through the ICT antigen test, which gives a conservatively high estimate compared with blood slides.

Extremely good progress has been made so far in reducing the prevalence of filariasis. Some preliminary conclusions can be drawn on the basis of the experience in nine countries and territories—American Samoa, Cook Islands, Fiji, French Polynesia, Niue, Samoa, Tonga, Tuvalu, and Vanuatu. In all of these except French Polynesia, the prevalence of filariasis (as estimated with the ICT test) fell by an average of 38% between the initial sentinel survey and the survey after the first or second round of MDA. The most dramatic decline was in Vanuatu (67%) and the smallest in Tonga (7%). The decline between surveys was not statistically significant in two countries, Tonga and Cook Islands, but it was significant in

**Figure 5-1:** Number of countries and areas implementing MDA and monitoring and evaluation by year



**Figure 5-2:** Reduction in antigen prevalence between baseline assessment (A) and final assessment (C)



American Samoa, Fiji, Niue, Samoa, and Tuvalu, besides Vanuatu. The prevalence of MI also fell significantly, by 93% (from 12% to 0.8%), in Vanuatu between the baseline survey and the midterm evaluation after two MDA rounds.

A dramatic reduction in prevalence—averaging 85%—between the baseline and final assessments was observed in the two countries that have completed five rounds of MDA. Niue achieved a reduction in prevalence from 3.1% to 0.2% after five years (Figure 5-2), thus meeting the target of less than 1%, which had been set at the start of PacELF. In Samoa, the prevalence fell from 4.5% to 1.1%, with some variation within the country.

There is not enough information on the three other MDA countries (Papua New Guinea, Kiribati and Wallis and Futuna) to determine if they are also progressing well. Papua New Guinea has only just begun its MDA. In Kiribati, although a formal midterm evaluation has not been carried out, spot checks suggest that the antigen prevalence has decreased to less than 1% from 1.7%. No information is available on Wallis and Futuna, which began MDA relatively late, in 2002.

However, in French Polynesia prevalence (a high 13.8% at the start) does not appear to be declining as fast as expected. The fact that both Kiribati

and French Polynesia are widely dispersed groups of small islands, some very remote, presents a significant challenge to maintaining MDA coverage at a high rate every year.

About 500,000 people in the Pacific were infected with filariasis at the start of PacELF. If all MDA countries were to follow the lead of Niue and Samoa, the prevalence of filarial antigen in the region would be reduced to 0.9%. If 85% reduction in prevalence is achieved by the time all countries have completed five rounds of MDA, about 425,000 cases of filariasis will have been treated or prevented.

## CONSTRAINTS

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PacELF, like all other programmes, has had many problems related to biology, geography, logistics, and politics to overcome. The extent of the problems varies from country to country. Biology-related constraints are due to the fact that some countries have a diurnally sub-periodic type of filariasis, as well as both day- and night-biting vectors, including the highly efficient vector *Ae. polynesiensis*. Transmission is thus more intense in these areas than in the parts of Micronesia, for example, where filariasis is transmitted by *Culex* mosquitoes. This is an inescapable fact and just means that more effort (and perhaps other control methods in addition to MDA) may be required to bring disease rates down sufficiently in some parts of Polynesia.

Geographical constraints arise because some island countries are widely dispersed and travel between them is infrequent or expensive or both. Even within islands, especially if mountainous, there are often villages in remote and inaccessible parts of the interior, and few roads. Poor and unreliable communications and

infrastructure also contribute to logistical difficulties and high shipping costs in the region.

Movement of people and migration is a significant phenomenon in the Pacific. This includes, among others, inter-island travel for study or work; permanent migration of Islanders to New Zealand, Australia, and other countries; part-time residence overseas with frequent visits back to visit family. The frequency of travel and migration makes it more likely that some people at risk will miss one or more MDAs, or that filariasis may be re-imported into countries from which it has been eliminated.

Complacency is apparent in certain countries with long histories of MDA for filariasis. People tend to settle into the belief that the disease cannot be eliminated and that medication must be taken year in and year out and into the foreseeable future. Education, advocacy, and enthusiastic support from all possible sources, including governments, health workers, and PacELF itself, are needed to overcome this barrier.



## THE PacELF WAY

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### REGIONAL COLLABORATION WITH A COMMON GOAL

An important feature of PacELF is that it offers a structure for the Pacific Island countries to join together and help each other to reach a common goal. Such cooperation comes naturally to those countries. Relatively isolated for hundreds of years, they rely on themselves and their communities to solve problems. Despite their many social and cultural differences, the communities all identify strongly with one another as Pacific Islanders and share a tradition of cooperation. Reciprocity is customary. Pacific Islanders are also renowned for the brave, pioneering spirit that moved them to explore and settle on the far-flung Islands spread across the Pacific Ocean.

The social structure within the Pacific Island countries greatly influenced the way in which PacELF activities were carried out in each country. Community leadership and organization vary markedly. For example, while the chiefly hereditary system of leadership is still strong in Polynesia and some parts of Micronesia, leadership and influence in Melanesian societies is more often achieved through individual achievements and gift exchanges. Women have markedly different roles and degrees of power, as was sometimes evident in how the MDA was organized. In Samoa, for example, medicines are distributed by the network of women's groups, a well-established feature of this society. In other countries like Vanuatu, where no such women's networks exist, health workers take on the role of drug distribution.

### PROGRAMME OWNERSHIP

PacELF owes a major part of its success so far to the fact that the governments of the Pacific Island countries initiated and took ownership of the programme from the start. PacELF staff in the countries also took full responsibility for the programme and relished the freedom it gave them to choose how it should be implemented—when MDA should start, who would deliver the drugs—while knowing that their decisions would be supported by the PacELF home office. Joining a regional program gave even the smallest of the island countries a voice in the process.

### OPERATIONAL FLEXIBILITY

Inevitably, when people own a programme, they feel free to adapt it to their own circumstances. As global pioneers in filariasis elimination, PacELF member countries modified some recommendations of the GPELF. For example, although the GPELF recommended that they use Mf prevalence as a monitoring and evaluation indicator, the PacELF countries decided to use ICT to estimate the prevalence of filariasis. Also, the PacELF participants saw no need to map filariasis distribution in great detail before starting MDA, partly because of their long history of filariasis control activities and the resulting knowledge of the distribution of the disease. From the recommendations of the Pacific Island countries, PacELF prepared its own set of detailed guidelines for country programme operation and for monitoring and evaluation.

MDA planning was decentralized, with each country being allowed to decide the best way to organize activities—how the MDA would be carried out, and by whom. To distribute DEC/albendazole, for instance, some countries go house to house, others issue the drugs at a health center or central location in the village, and still others have chosen mass distribution in public places. This flexibility in MDA organization, timing, and method of drug delivery is especially important in countries where the filariasis programme is only one of many health programmes handled by a small health staff.

### A SIMPLE CORE PACKAGE OF ACTIVITIES

PacELF is a success partly because of its straightforward, easily understandable package of core functions. The two core functions are blood surveys and MDA. All other activities support these functions. It is necessary to plan, train for MOA, pack drugs, deliver drugs where they are needed, administer drugs, keep records, assess coverage, do blood surveys, and analyse the results. Although the PacELF home office assists with all of these tasks, they are time-consuming and in most countries require a full-time programme manager.

### EFFECTIVE COORDINATION

The central coordinating structure at the PacELF home office in Suva is a vital part of the programme. The home office mediates between the countries and donors, and helps to channel and maximize support for the countries from the many outside donors or technical support agencies. One of its main roles is to support the efforts of the countries, without taking

over ownership. The home office orders supplies of drugs and test kits, prepares reports and publications, and handles data, relieving the countries of much of the burden of administration, besides offering the advantage of purchasing at bulk rates. Some of the smaller isolated countries would not have been able to take on these tasks alone. By providing computers to some countries PacELF has helped strengthen local capacity for data management. There have been opportunities to learn new computer software, as well as training workshops in the clinical management of lymphoedema or mosquito identification.

Certain features of the PacELF support to countries are also very important. The PacELF home office in Suva strives to be a reliable and trustworthy "home" for the PacELF "family", responding quickly to the countries' requests. It makes a great effort to order supplies and ship them out to countries early enough so that they are on hand when needed. Supportive technical advice is always freely available and PacELF staff often visit the countries. The PacELF home office also hosts annual meetings at which the programme managers from the various countries can exchange information and ideas. These meetings are informal occasions with opportunities to dance, sing, and perform skills in true Pacific style, apart from the serious business of assessing progress. The location of these meetings alternates between Fiji and other PacELF countries.

### FOCUS ON THE POSITIVE OUTCOME

PacELF maintains a positive focus on a future in which lymphatic filariasis is no longer a risk to Pacific Islanders. Positive messages are always used, in keeping with the



Pacific attitude to life. Slogans like "For the future of our children", "We can do it", "Let's get the job done together", and "Work together and help each other" capture the essence of this approach.

Having a defined and achievable goal (eliminating filariasis) has helped keep up the momentum and enthusiasm of PacELF family members and engage local communities in the campaign.

## WHAT'S NEXT?

### A SUSTAINED, EXPANDED PROGRAMME

The MDA programmes that are still operating must continue. Although most will be complete by 2007, Papua New Guinea's will continue for several more years. The enthusiasm and momentum must be kept up. Coverage must stay high if MDA is to succeed. Special attention must be given to that part of the population that year after year does not take the drugs (systematic non-compliance) since they represent a reservoir for future resurgence.

MDA by itself may not completely eliminate the disease. The MDAs will no doubt have a large impact, but other measures may be needed to sustain this achievement until the disease is eliminated. Parts of countries that remain infected can also opt for vector control or selective treatment. The Melanesian areas, where the *Anopheles* mosquito is the primary vector, can use bed nets or curtains and insecticides. Other methods of vector control like the use of insecticide-treated materials have potential in Polynesia and Micronesia as well.

PacELF's first priority was to eliminate the risk of new infections. Now it must give much more attention to reducing morbidity among those who already have the disease. Health service limitations in most countries where filariasis is endemic have restricted the possibility of hydrocoele surgeries, for instance; a way around

this problem must be found. It will also be a challenge to teach enough health workers and community members how to treat lymphoedema early to decrease the swelling and prevent further pathology.

The PacELF activities must be better integrated into the countries' public health systems. At the moment PacELF is a vertical programme. This is probably necessary while MDAs are continuing, but when they are completed the programme will probably become less vertical, and all members of the health services must be alert for any resurgence of the disease. Opportunities to maximize the effects of other ongoing programmes must be seized whenever possible. For example, anti-helminth drugs provided through school health programmes would maintain and build on PacELF's gains after the main MDA programmes and help prevent resurgence by continuing the treatment of new filariasis infections in children. Mosquito control, malaria, dengue, and environmental health programmes may also contribute to vector control and must be supported.

Continued surveillance after the MDAs is crucial, even when transmission is believed to have stopped. This could be done through national health information systems, by alert health workers, at designated sentinel sites, or through special surveys.

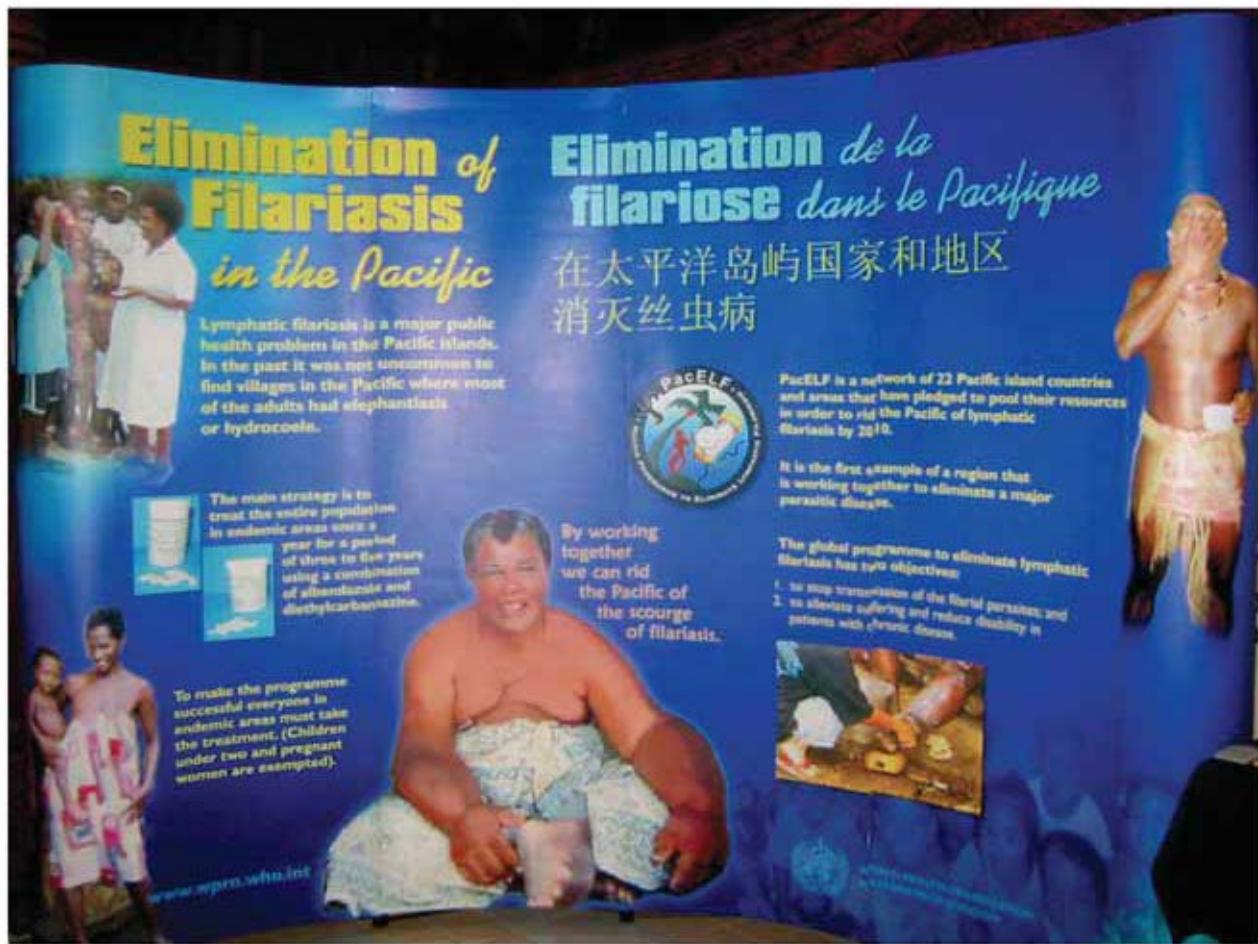
## TECHNICAL CHALLENGES

Sampling for filariasis prevalence is a complex matter, because the disease is heterogeneous. It became apparent soon after the start of midterm evaluations that sampling difficulties and the imprecise tools available would make it far from easy to determine by ICT whether or not a country had reached a prevalence of less than 1%. Also because filariasis is heterogeneous, "hot spots" of high prevalence could remain unnoticed if they are not selected for testing in the baseline or midterm evaluations. The danger is that transmission could be re-established and these sites could cause resurgence of the disease in other areas once MDA is stopped. Therefore, it was decided that

sampling had to be more comprehensive than originally planned before MDA could be stopped. Detailed guidelines for the sampling were included in the PacMAN book. The new sampling scheme was smoothly implemented starting with Samoa, the first country to finish five rounds.

When to stop MDA and when to stop surveillance are two very difficult decisions to be made. There is not yet enough information on which to base these decisions. The Technical Advisory Group to the Global Programme is devising criteria for elimination. But the group will also look to PacELF and its results over the next few years for guidance, as the programme is ahead of most other programmes in the world.

Figure 5-23: PacELF display



A very large amount of data on prevalence and drug coverage has been gathered during the progress of PacELF, and may yield important information on the effectiveness of drugs or on the monitoring and evaluation process. This information could be very useful to other filariasis elimination programmes and to PacELF itself in determining problem areas in the region. For example, knowledge of the relationship between ICT and Mf prevalence, and the age-specific pattern of infection, will help in planning surveillance strategies. PacELF countries will make this information available to the Global Alliance as it is analysed and reported.

## MAINTAINING THE PacELF WAY

So far, the programme is definitely on track. By 2010, the target date for eliminating filariasis in most of the Pacific Island countries, all the countries except Papua New Guinea will have completed at least five rounds of MDA and, if necessary, targeted or selective treatment or vector control, and conducted final evaluation and transmission surveys. In Papua New Guinea most of the population will have

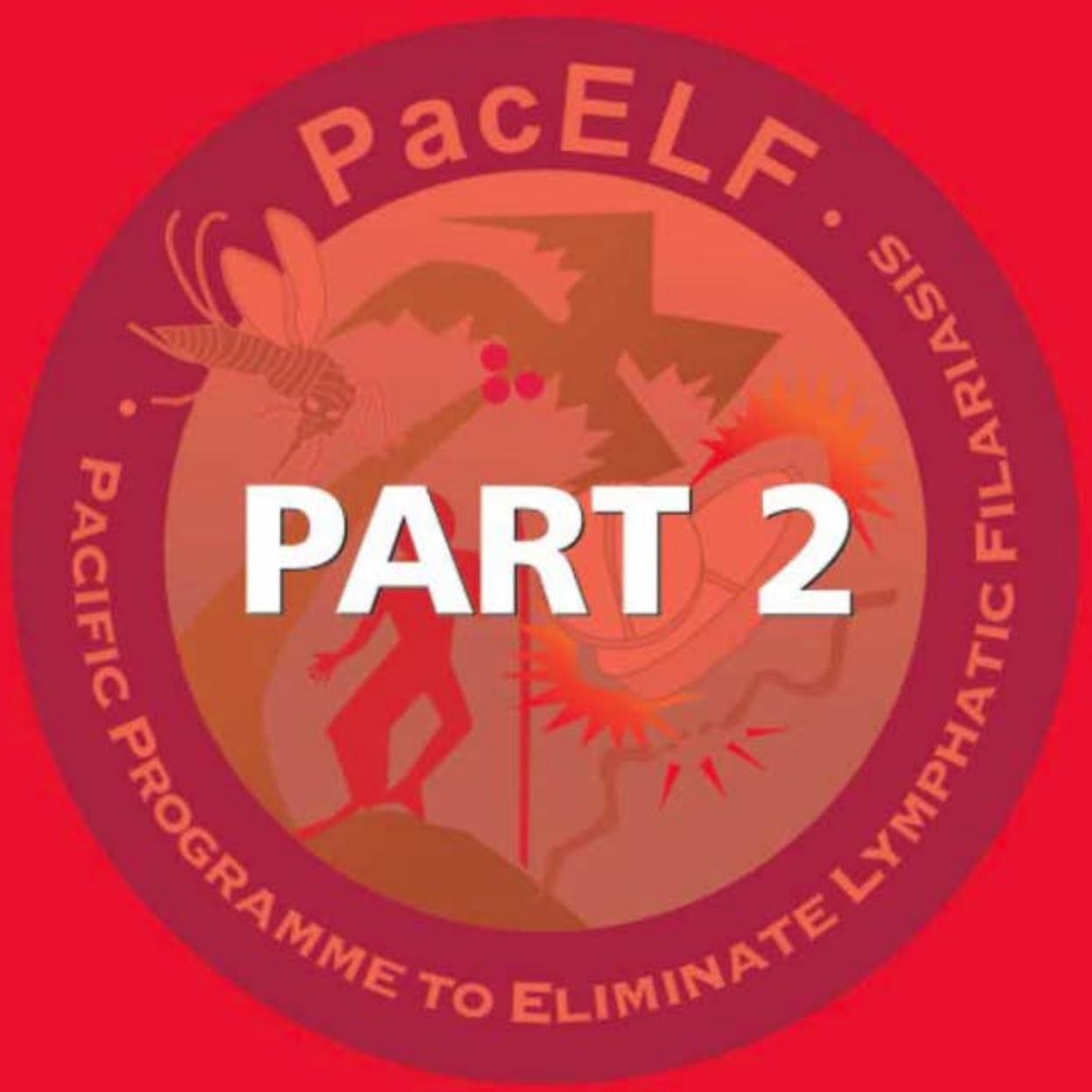
undergone at least three MDA rounds. If MDA coverage and follow-up activities are adequate, PacELF expects filariasis prevalence to be dramatically reduced in all countries in the region.

PacELF and filariasis elimination must maintain and even increase their high profile in the region, through political and social advocacy at all levels, with regional and national governments, international and national organizations, health facilities, village and community leaders, and individuals.

People with filariasis can make an especially important contribution. A man with advanced elephantiasis in Kiribati, when asked if his photograph could be used in PacELF's health promotion materials, agreed and added, "I realize that my own disease cannot be cured. I used to be a teacher, but for a long time now I haven't been able to teach, or even walk by myself. I depend on others to help me do everything. Now, by showing my photograph and telling my story, I can again be useful and make a contribution. I can help to prevent others from getting this disease."

By working together and helping one another in the "PacELF way", we can and will eliminate filariasis from the Pacific and ensure a better future for our children.







# Country Programmes

## Introduction

This part of the book gives detailed information on each PacELF country plan and programme. There is a section for each participating country, arranged alphabetically. Each country has developed a specific plan for monitoring and evaluation of the programme in their own circumstances, and their plans are shown as a schematic diagram on each country's page.

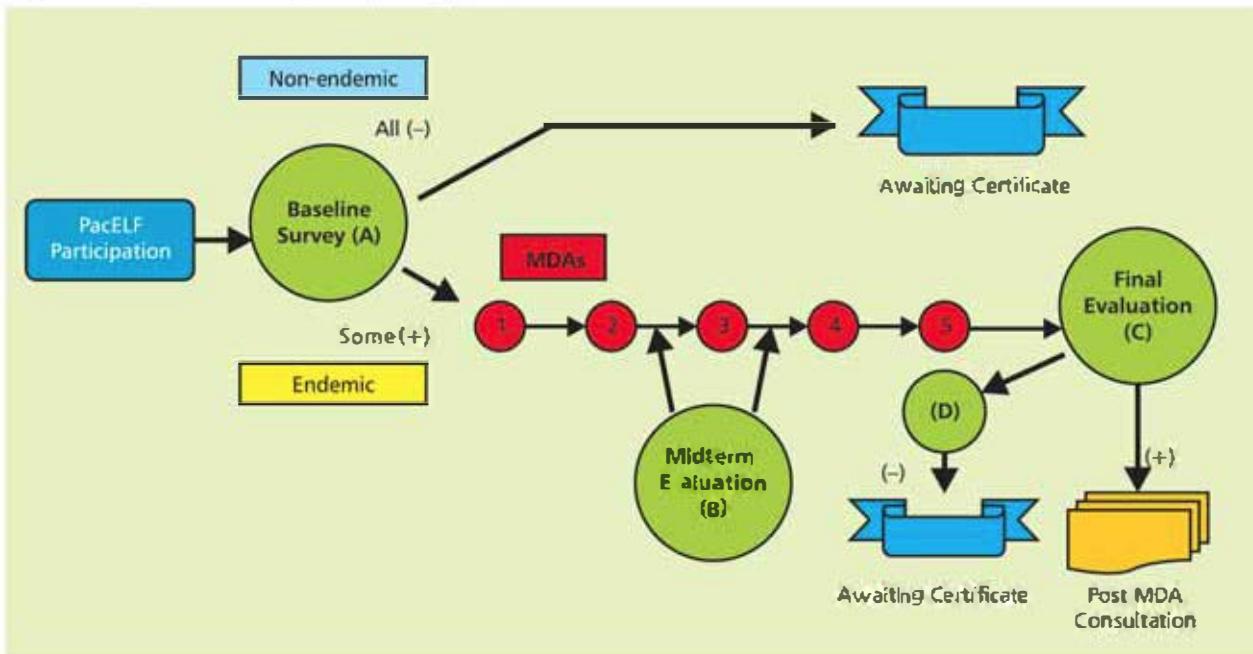
In each country's section, first we give statistical, economic, geographical, meteorological and demographic information on each country. We include a table listing known mosquito vectors of filariasis and filarial type in each country. This is followed by a graph summarizing the available information on filariasis prevalence in the country in the 1900s. There are tables listing historical and bibliographical information on filariasis in the country and any control programmes done in the years prior to the start of PacELF. Then comes the diagram of the country's plan for blood surveys and MDAs under PacELF, followed by the blood survey results, and the MDA coverage achieved, and tables showing the distribution of drugs and ICT kits. The MDA coverage by year is displayed in a barchart. Each section also gives examples of the country's MDA registration books and health promotion materials, as well as photographs of the country staff.

A basic PacELF country plan is shown in Fig 2-1 and the key to the symbols used in each country's plan is shown in Fig 2-2. The definition of each assessment survey is in Table 2-1.

- (1) The total population reported to PacELF by the country ('Reported population');
- (2) The estimated population, derived from the most recent census and the 2004 estimates by SPC assuming constant country-specific growth rates over the years 1999 to 2004. These population estimates are shown in Table 2-1 ('Estimated population');
- (3) The population that was actually recorded in the MDA register books ('Registered population').



**Figure 2-1: Algorithm of PacELF country strategy (basic)**



**Figure 2-2: Keys to the symbols used in country plan**



**Table 2-1: Survey types for PacMAN plan**

Survey type	Assessment	Method	Purpose
<b>A type</b>	Initial baseline survey	Various methodologies used, e.g., convenience, cluster sampling	To define the country endemicity and to decide whether to implement MDA or not
<b>B type</b>	Midterm assessment	Sentinel sites and spot check sites	To assess the impact of MDAs and to check that the programme is being implemented properly
<b>C type</b>	Final prevalence assessment	All areas of the country and in sentinel sites	To assess the impact of MDAs, to determine whether all areas are at less than 1% prevalence and to find any remaining pockets of foci
<b>D type</b>	Transmission assessment	LoAS or complete survey of 5- to 6-year-old children	To determine the five-year incidence

Table 2-2: Estimated population<sup>a</sup> by year in PacELF member states, 1996–2008

	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	Growth Rate
American Samoa				55 964	57 291	58 618	59 946	61 273	62 600	63 900	65 200	66 500	67 800	2.0
Cook Islands**				18 821	18 424	18 027	17 630	17 233	16 836	16 596	16 355	16 235	15 995	-1.3
Federated States of Micronesia				105 585	107 008	108 431	109 854	111 277	112 700	114 100	115 500	116 900	118 300	1.2
Fiji	775 077	782 692	790 308	797 923	805 539	813 154	820 769	828 385	836 000	841 500	847 100	852 700	858 400	0.7
French Polynesia				236 325	239 160	241 995	244 830	247 665	250 500	255 000	259 600	264 300	269 000	1.8
Guam				151 981	154 805	157 629	160 453	163 276	166 100	168 400	170 800	173 200	175 600	1.4
Kiribati				82 343	84 494	86 646	88 797	90 949	93 100	95 200	97 400	99 600	101 900	2.3
Marshall Islands				50 840	51 752	52 664	53 576	54 488	55 400	56 300	57 200	58 100	59 000	1.6
Nauru				10 013	10 030	10 048	10 065	10 083	10 100	10 200	10 300	10 400	10 500	1.0
New Caledonia	196 836	201 844	206 852	211 860	216 868	221 876	226 884	231 892	236 900	241 400	246 000	250 600	255 400	1.9
Niue				1 913	1 851	1 788	1 725	1 663	1 600	1 500	1 500	1 400	1 400	-3.8
Northern Mariana Islands				67 026	69 221	71 416	73 611	75 805	78 000	80 400	82 900	85 500	88 100	3.1
Palau				18 736	19 129	19 522	19 915	20 307	20 700	21 100	21 500	22 000	22 400	2.0
Papua New Guinea				5 064 658	5 190 786	5 316 915	5 442 686	5 568 889	5 695 300	5 820 000	5 947 500	6 077 800	6 210 900	2.2
Pitcairn Islands									52***					
Samoa				172 717	174 713	176 710	178 707	180 703	182 700	184 400	186 000	187 700	189 400	0.9
Solomon Islands				409 042	419 254	429 465	439 677	449 888	460 100	470 700	481 500	492 600	503 900	2.3
Tonga	97 784	97 849	97 913	97 978	98 042	98 107	98 171	98 236	98 300	98 000	97 700	97 400	97 100	-0.3
Tokelau				1 562	1 549	1 537	1 525	1 512	1 500	1 500	1 500	1 500	1 500	0.0
Tuvalu				9503	9522	9542	9561	9581	9600	9600	9700	9700	9700	0.4
Vanuatu				186 678	192 502	198 327	204 151	209 976	215 800	221 600	227 500	233 500	239 800	2.7
Wallis and Futuna				15 032	15 010	14 988	14 966	14 944	14 900	15 000	15 000	15 100	15 200	0.5



census year

SPC estimate for 2004

SPC future projections

<sup>a</sup>2004 to 2008 figures provided by SPC (2004). Earlier years estimated by PacELF assuming constant growth (or decline) between census and 2004.

\*\*Cook Islands total population estimated by PacELF assuming same growth rate as for resident population (SPC estimates are based on resident population).

\*\*\*SPC document does not give a census year for Pitcairn. It says that 7 of the 52 were temporary residents, but doesn't say when they became resident.



# American Samoa



## 1 Summary

An unincorporated territory of the United States, American Samoa consists of seven islands situated between 14°S to 15°S and 168°W to 171°W. It has a land area of 200 sq km and a population of 57,291 (2000 census). The estimated population in mid-year 2004 was 62,600 (SPC 2004). The capital is Pago Pago on the main island of Tutuila.

The islands that now compose Samoa and American Samoa were divided into two entities in 1889, and Tutuila came under the control of the US Navy in 1899. The name "American Samoa" was given to the territory in 1911, but it was formally ceded to the USA only in 1929. Since 1951 American Samoa has been administered by the US Department of the Interior.

Many studies of Mf prevalence have been carried out in American Samoa throughout the 20th century. A survey of both American and Western Samoa in 1923 found a 28.7% Mf positive rate in the population of 4,294 surveyed (O'Connor 1923). Surveys in the 1940s and 1950s found Mf positive rates of 16% to 20% (Dickson et al. 1923, Murray 1948, Jachowski and Otto 1955). In 1930 a survey of the whole population reported elephantiasis rates of 6.7% on both the main island of Tutuila and the Manua group (Phelps et al. 1930). Similar elephantiasis rates were reported in a 1943 study that also reported hydrocoele rates of 6% (Dickson et al. 1943).

The high prevalence and frequency of elephantiasis prompted control attempts in the 1960s. MDAs were carried out in 1963 and 1965 with 72 mg of DEC given per kilogram of body weight. A post-treatment survey in 1970–1972 determined that the Mf rate had dropped to 0.9%, elephantiasis to less than 1%, and hydrocoele to 2.1%. However, surveys in the 1980s and 1990s showed Mf rates to be increasing again (country data, unpublished).

American Samoa participated in PacELF activities starting in 1999. A nationwide baseline survey in 1999 reported an LF antigen-positive rate of 16.5% (498 positive cases in 3018 people examined) (country report 2000).

A yearly MDA using DEC (6 mg/kg) and albendazole (400 mg) began in 2000. The first MDA in 1999–2000 covered 11 081 people (a reported coverage of 23.7%) (country report 2000). Because the MDA in 2000 did not achieve sufficient coverage, a second MDA was carried out, covering 29 991 people (a reported coverage of 52.4%) (country report 2001). After the second MDA, a blood survey in four villages in 2001 found 121 antigen-positive cases (11.5%) and 28 Mf-positive cases (2.7%) out of 1052 people examined (country presentation at fourth PacELF annual meeting in 2002). A third MDA in 2002 covered 28 400 people (49.6% coverage) (country report 2003) and a fourth MDA in 2003 covered 40 211 people (70.2% coverage). In 2003 a blood antigen survey in four villages found 135 antigen-positive cases out of 1000 people examined (13.5%) (country presentation at fifth PacELF annual meeting in 2003). A fifth MDA in 2004 achieved a coverage of 64.6%, treating 37 018 people.

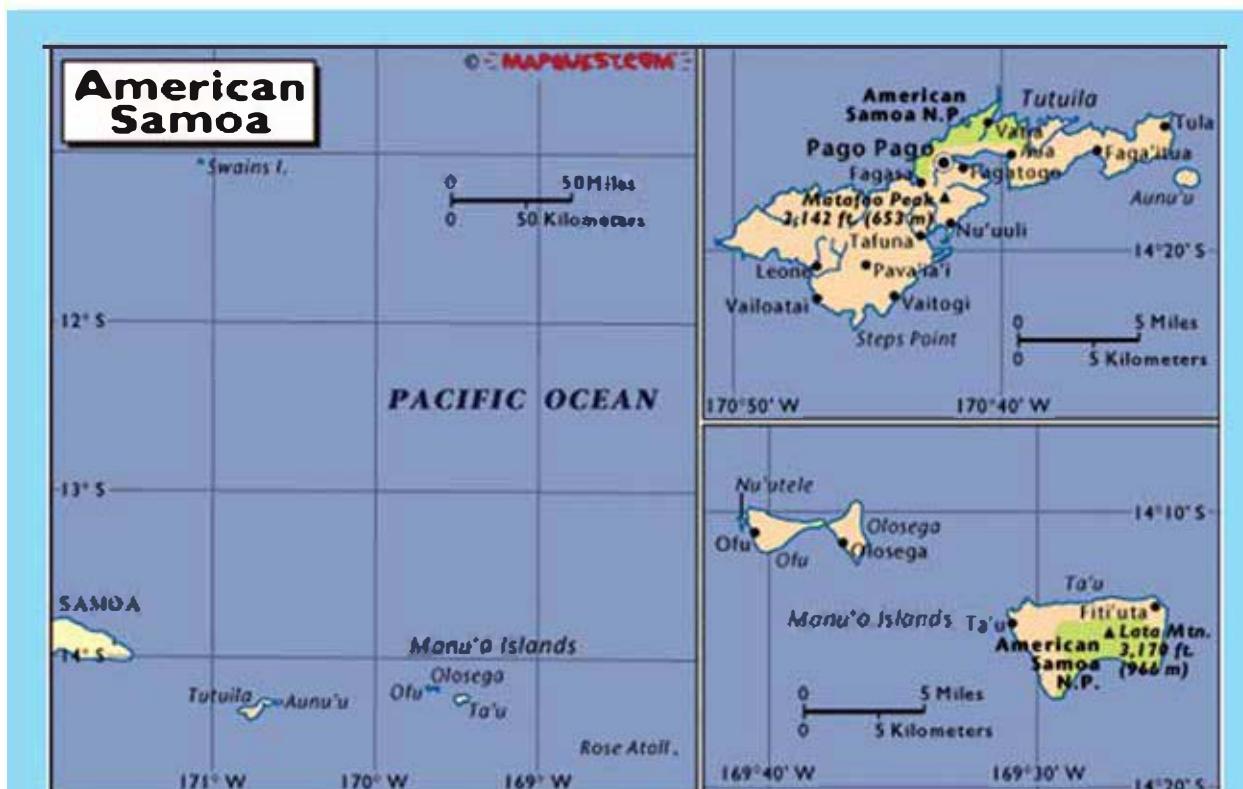


## 2 Country Profile

### Filariasis Type and Vectors

Filariasis latest status	Endemic
Filaria type	<i>Wuchereria bancrofti</i>
Mosquito vectors	<i>Aedes polynesiensis; Aedes oceanicus, samoanus, tutuilae</i>

Source: Culicidae of the Australasian Region, Volume 12, 1989.



Source: MapQuest.com

### Coat of Arms



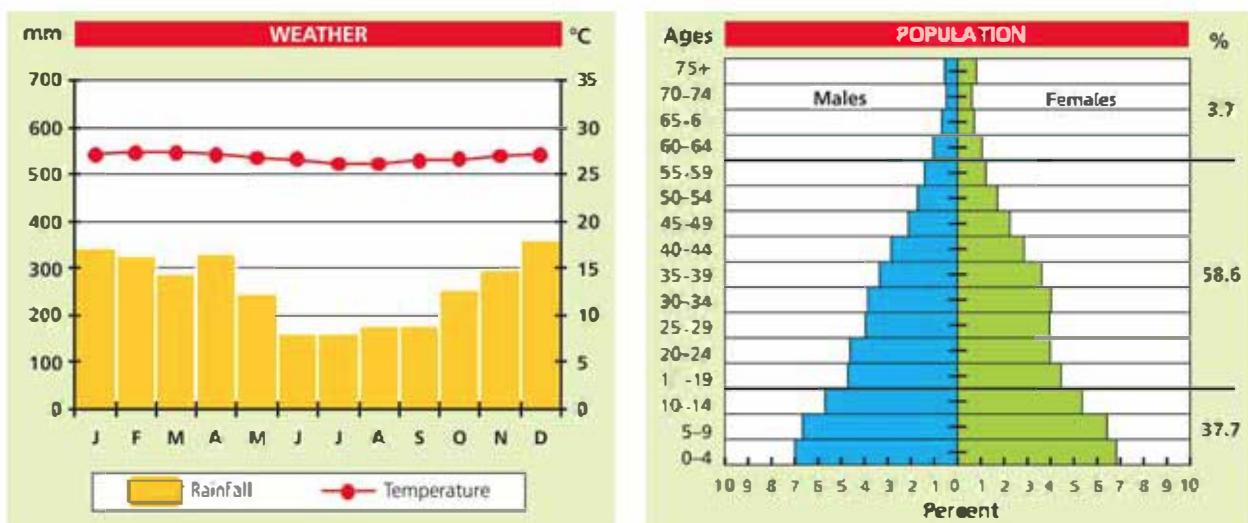
Source: Wikipedia



## General Information

Capital city	Pago Pago
Number of islands	7
Land area	200 sq km
Languages	Samoan, English
People	Polynesian (89%), Tongan (4%), Caucasian (2%), other (5%)
Gross domestic product (GDP) per capita	\$8000 (2000 est.), Territory of the United States of America
Economy	Grants from the United States of America, tuna canning, tourism
Total population by census (2000)	57 291
Population estimated (2004)	62 600
Population density (people/km <sup>2</sup> )	313
Infant mortality rate (per 1000 live births) (2001)	8.5
Maternal mortality rate (per 100 000 live births) (2002)	123
Life expectancy at birth (1995)	72.0
Leading causes of mortality (2001)	Heart disease, neoplasms, diabetes, cerebrovascular disease, accidents

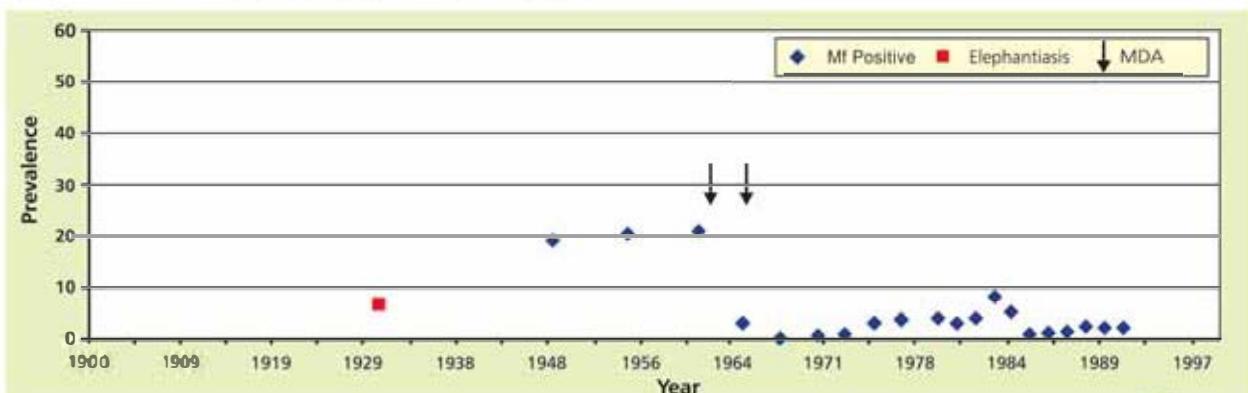
Source: Country Health Information Profile 2004 (WHO Regional Office for the Western Pacific), Secretariat of the Pacific Community (SPC), Lonely Planet Destinations



Source: WorldClimate  
Temperature: Pago Pago 1961 to 1990,  
Rainfall: Pago Pago 1966 to 1995

Source: Secretariat of the Pacific Community, 2000

## 3 Filariasis before PacELF, 1900–1997



## Country Filariasis Activities in the 1900s before PacELF

### Microfilaria Prevalence and Clinical Surveys

Population/Area	Date	% Mf pos (n)	Noted Clinical Features % (n)	Primary Reference
Age > 15	1923	47.3 (422) with either MF or Clinical		O'Conner FW (1923)
Nationwide	1930		Elephantiasis: 6.7 (10 000)	Phelps JR, et al (1930)
Age > 4	1948	19.1 (5144); Avg. MF/slide 41.3		Murray WD (1948)
10 villages	1955	20.3 (2421)		Jachowski LA and Otto GF (1955)
5 villages in Tutuila	1962	21 (1000)		WHO/SPC (1974)
5 villages in Tutuila	1965	3.1 (1135)		WHO/SPC (1974)
13 villages in Tutuila	1968	0.3 (1053)		WHO/SPC (1974)
	1971	0.8 (14 396)		WHO/SPC (1974)
	1973	1.0 (16 461)		WHO/SPC (1974)
	1975	2.9 (4530)		WHO/SPC (1974)
	1977	3.7 (7351)		WHO/SPC (1974)
9 villages in Tutuila	1980-1981	5.7 (931)		Country data
Bacteriology Lab Referrals	1980	3.4 (2147)		Country data
Bacteriology Lab Referrals	1981	3.1 (1728)		Country data
Bacteriology Lab Referrals	1982	3.9 (386)		Country data
Bacteriology Lab Referrals	1983	8.1 (99)		Country data
Bacteriology Lab Referrals	1984	5.3 (75)		Country data
Nationwide	1985	1.1 (5230)		Country data
Bacteriology Lab Referrals	1985	4.3 (46)		Country data
Nationwide	1986	1.2 (3535)		Country data
Bacteriology Lab Referrals	1986	2.9 (70)		Country data
Nationwide	1987	1.5 (2597)		Country data
Bacteriology Lab Referrals	1987	5.7 (70)		Country data
Nationwide	1988	2.6 (3451)		Country data
Bacteriology Lab Referrals	1988	3.2 (94)		Country data
Nationwide	1989	2.3 (3283)		Country data
Bacteriology Lab Referrals	1989	1.2 (83)		Country data
Nationwide	1990	2.2 (2180)		Country data

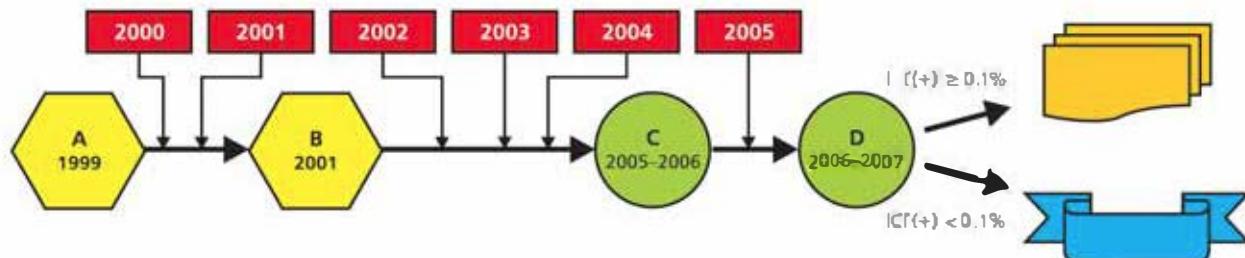
### Mass Drug Administration or Other Control Measures

Population/Area	Date	Activity	Details	Primary Reference
Tutuila	1963	MDA	6 mg/kg DEC given: a total dose of 72 mg/kg over a period of one year	WHO/SPC (1974)
Tutuila	1965	MDA	6 mg/kg DEC given: a total dose of 72 mg/kg over a period of one year	WHO/SPC (1974)



## 4 PacELF Activity

### PacELF Country Plan



Type	Year	Sampling	Target	Result
A	1999	Convenience	Nationwide (18 villages)	ICT 16.5% (498/3018)
B	2001	Cluster	Fagasa, Pago Pago, Faga'itua, Aunu'u islands	ICT 11.5% (121/1052), Mf 2.7% (28/1052)
C	2005-2006	Cluster	Stratified survey by health district	
D	2006-2007	Complete	2,000 all 5- to 6-year-old children	

Source: PacMAN Book 2004

### Results of Blood Surveys and MDAs under PacELF

#### Blood Surveys

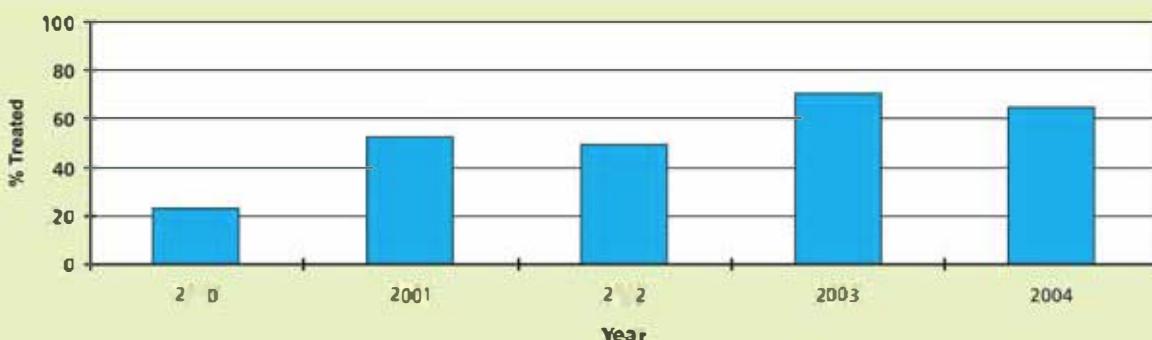
Date	Method	Target	Sampling	No. examined	No. of positives	Positive rate (%)	Remarks	Reference
Feb-Aug99	ICT	Whole area (18 villages)	convenience sample	3018	498	16.5		Presentation in AM4
2001	ICT	Sentinel site (4 villages)	random	1052	121	11.5	ME with CDC	Presentation in AM4
2001	Mf	Sentinel site (4 villages)	random	1052	28	2.7	ME with CDC	Presentation in AM4
2003	ICT	Sentinel site (4 villages)	random	1000	135	13.5		Presentation in AM5

#### MDAs

Date	MDA	Reported population	Estimated population*	Registered population	% Registered	Treated population	% Treated / Reported	% Treated / Estimated*	% Treated / Registered	Reference
Nov99-May00	1st	46 773	57 291	18 657	39.9	11 081	23.7	19.3	59.4	2000 MDA Report
Sep01-Dec01	2nd	57 291	58 618	52 322	91.3	29 991	52.4	51.2	57.3	2001 MDA Final Report
Aug02-Jan03	3rd	57 291	59 946	57 291	100	28 400	49.6	47.4	49.6	2002 MDA Report
Aug03-Nov03	4th	57 291	61 273	57 291	100	40 211	70.2	65.6	70.2	Annual Report 2003
Sep04-Dec04	5th	57 291	62 600			37 018	64.6	59.1		Annual Report 2004

\*Estimating a constant growth rate between latest figures and 2004 population estimate (SPC)

#### MDA Coverage, 2000–2004



## The PacELF Way Towards the Elimination of Lymphatic Filariasis in the Pacific

### Supplies Shipped from PacELF: 2000-2004

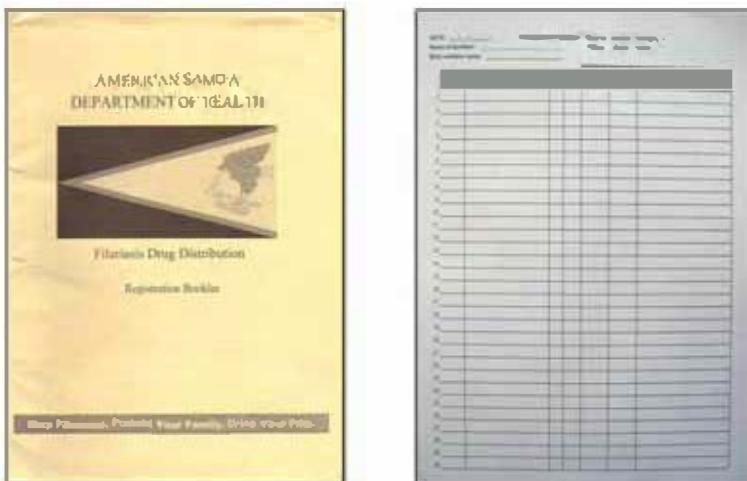
Year	2000	2001	2002	2003	2004
ALB (tablets)	140 000	-	41 600	15 000	47 000
DEC (tablets)	1 000 000	-	300 000	-	50 000
ICT (test cards)	-	-	-	-	-

Partnership: WHO, GSK (albendazole), CDC (technical/financial assistance)

### Distribution Dose of DEC and Albendazole Tablets

Age	No. of DEC (50 mg) tablets	No. of albendazole (400 mg) tablets
2-3	1	1
4-5	2	1
6-10	3	1
11-15	5	1
16-20	7	1
21-50	9	1
50+	8	1

### Registration Form



### IEC Materials

**We Can Get Rid of Filariasis in American Samoa.**



What is filariasis? Filariasis is a painful disease caused by tiny worms that live in the blood. People are infected for years before symptoms develop. Filariasis is only spread by the bite of an infected mosquito.

Are there any side effects I should know about? Most people do not feel any effects from the medicine at all. Some people who have the worms in their blood may get sick and have fever after taking the pills. The medicine though are working to kill the worms. Side effects like dizziness, tiredness or back to the stomach and having only a few bowel movements.

Where can I call if I have questions? Call the health center nearest to your child's school for more information.

Amauta: 622-7456	Fagatogo: 633-4388
Tafuna: 639-6380	633-7224
Leone: 688-7822	633-4559
Cau: 655-5176	Tasi: 677-2513

Leaflet (for school)





Bao



T-shirt



### Banner



Boston



Laflat

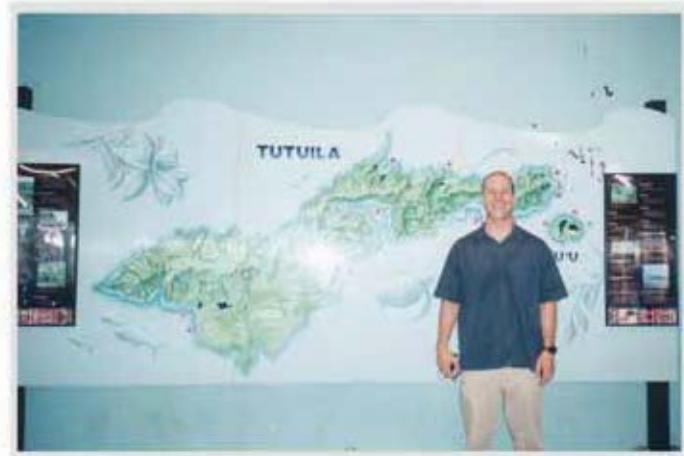


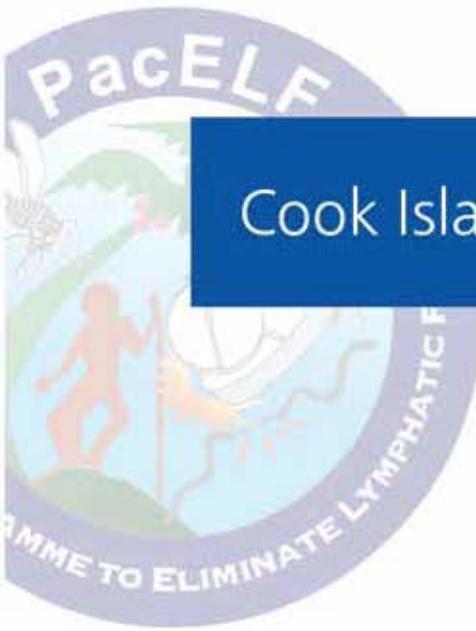
Leaflet (Samson)

The PacELF Way Towards the Elimination of Lymphatic Filariasis in the Pacific

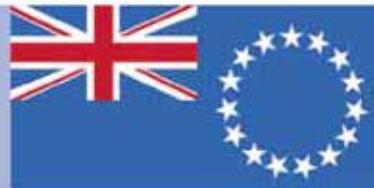
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Operational Staff: Public health nurse, health inspector, laboratory staff





## Cook Islands



### 1 Summary

The Cook Islands is made up of 15 islands situated between 8°S to 23°S and 156°W to 167°W. There are two distinct groups of islands, northern and southern. The Cook Islands is self-governing in free association with New Zealand. Its land area is 238 sq km with a population of 18,027 at the 2001 census. However, about one-sixth of those counted are usually resident in New Zealand. The estimated population of "usual residents" of the Cook Islands in 2004 was 14,000 (SPC 2004). The capital is Avarua, on the island of Rarotonga.

The first study of Mf prevalence was recorded in 1925. It found extremely high rates (40.1% on Rarotonga and 50.7% on Aitutaki) (McKenzie 1925). In 1926, surveys on Mangaia, Mauke, Mitiaro and Aitutaki found Mf rates ranging from 26% to 54.8% (Lambert 1926; quoted in Iyengar 1959). By 1959, Mf rates had fallen to 22.3% on Rarotonga and 29.2% on Aitutaki. The northern atolls were also surveyed in 1959 and Mf rates ranged from 5.8% to 29.4% (McCarthy 1959). Surveys from 1925 to 1959 also found cases of elephantiasis with rates ranging from 0% to 5.6% (reported by Sasa 1976).

An MDA campaign was carried out on Aitutaki in 1968 which reduced the Mf rates to 0.8% in 1969 and 0.2% in 1971 (WHO/SPC 1974). However, a survey of Aitutaki in 1992 showed Mf rates had increased to 3.3% (country data).

In 1999 the Cook Islands participated in PacELF. In a countrywide baseline survey carried out using antigen test kits in 1999, 8.6% (162/1884) of the population was positive by ICT. The Cook Islands was therefore classified as an endemic country.

MDA using DEC (6 mg/kg) and albendazole (400 mg) commenced in 2000 under the auspices of PacELF. The first MDA was implemented in 2000 and treated 11,928 of the population, giving a reported coverage of 62.4% (country presentation at Fourth PacELF Annual Meeting in 2002). The second MDA in 2001 covered 11,562 people (a reported coverage of 64.1%) (country presentation at Fourth PacELF Annual Meeting in 2002). After the second MDA, a blood survey in four villages in 2001 found 35 antigen-positive cases in 460 people examined (7.6%). The third MDA in 2002 treated 17,676 people (coverage of 98.0%) (country report 2002). After the third MDA, a midterm countrywide survey was carried out in 11 islands in October 2001: nine antigen positives were found in 2025 people examined (0.4%) (country presentation at Fifth PacELF Annual Meeting in 2003). The fourth MDA was implemented in 2003 and 13,048 people were treated with a reported coverage of 88.4%. The fifth MDA in 2004 treated 12,900 people with a reported coverage of 92.8%.

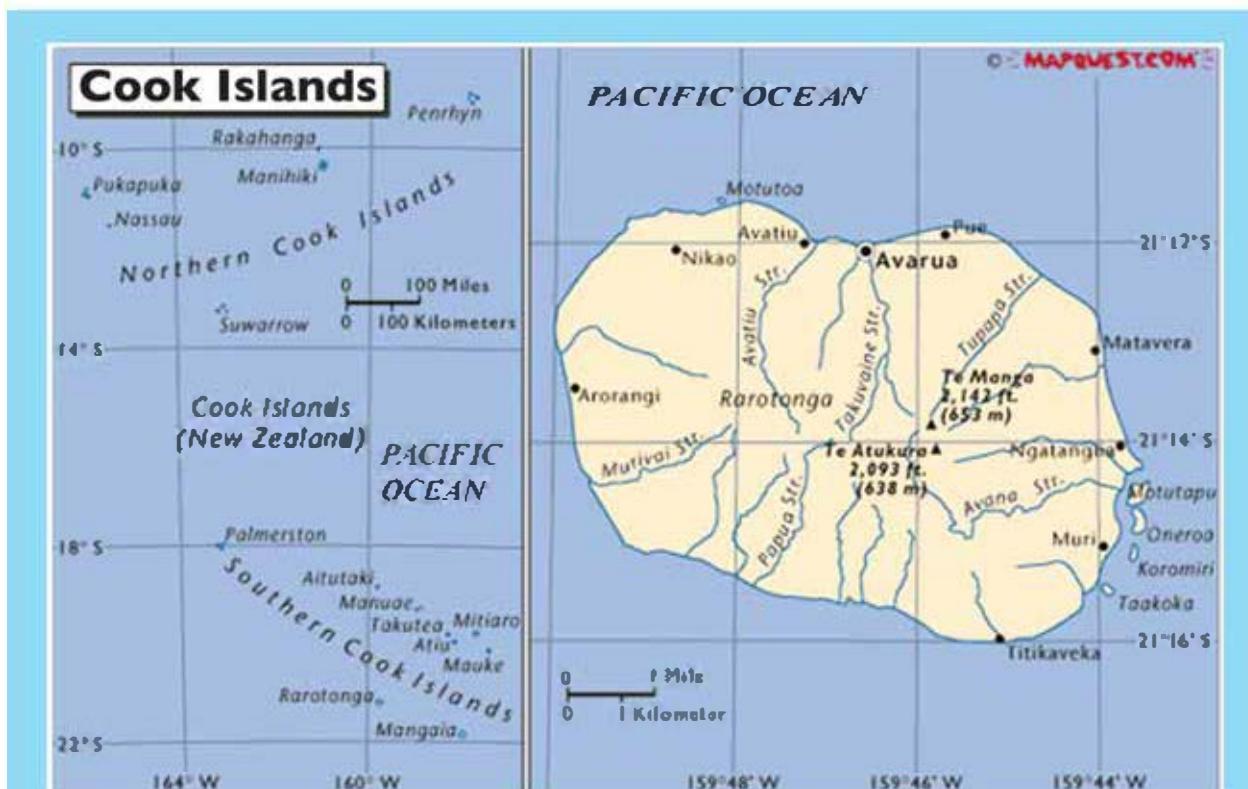


## 2 Country Profile

### Filariasis Type and Vectors

Filariasis latest status	Endemic
Filaria type	<i>Wuchereria bancrofti</i>
Mosquito vectors	<i>Aedes polynesiensis</i>

Source: *Culicidae of the Australasian Region, Volume 12, 1989*



Source: MapQuest.com

### Coat of Arms



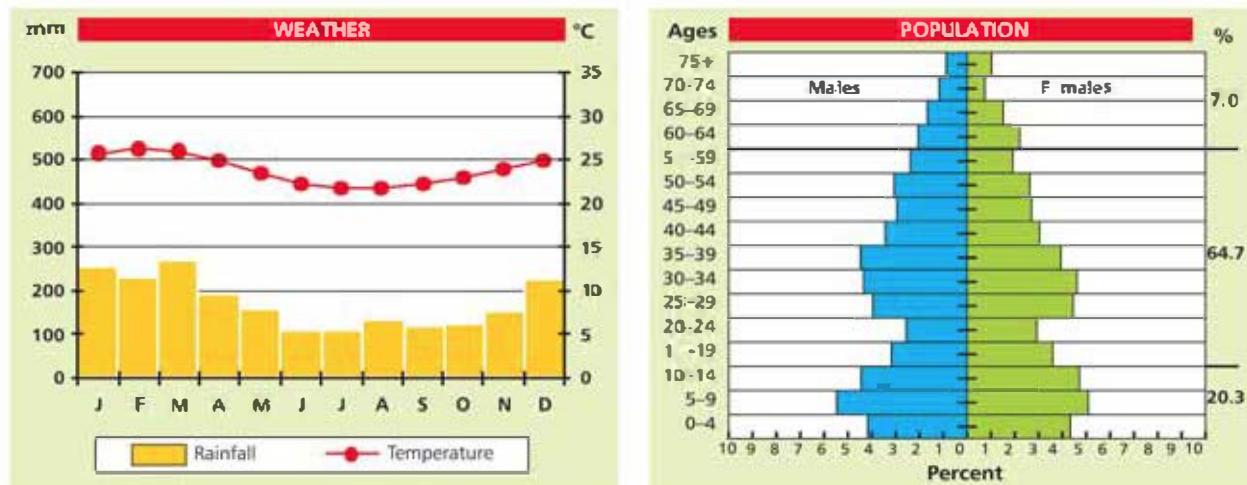
Source: Wikipedia



## General Information

Capital city	Avarua
Number of islands	15
Land area	237 sq km
Languages	English, Maori
People	Polynesian (80%), mixed Polynesian and European (8%)
Gross domestic product (GDP) per capita	\$4270 (2001)
Economy	Fruit processing, tourism, fishing
Total population by census (2001)	18 027
Population estimated (2004)	14 000
Population density (people/km <sup>2</sup> )	59
Infant mortality rate (per 1000 live births) (1996–2002)	21
Maternal mortality rate (per 100 000 live births) (2002)	Not available
Life expectancy at birth (2001)	72.5
Leading causes of mortality (2002)	Diseases of the circulatory system, neoplasms, endocrine, nutritional and metabolic diseases; diseases of the respiratory system, nutritional and metabolic disease, injury, poisoning, and certain other consequences of external causes

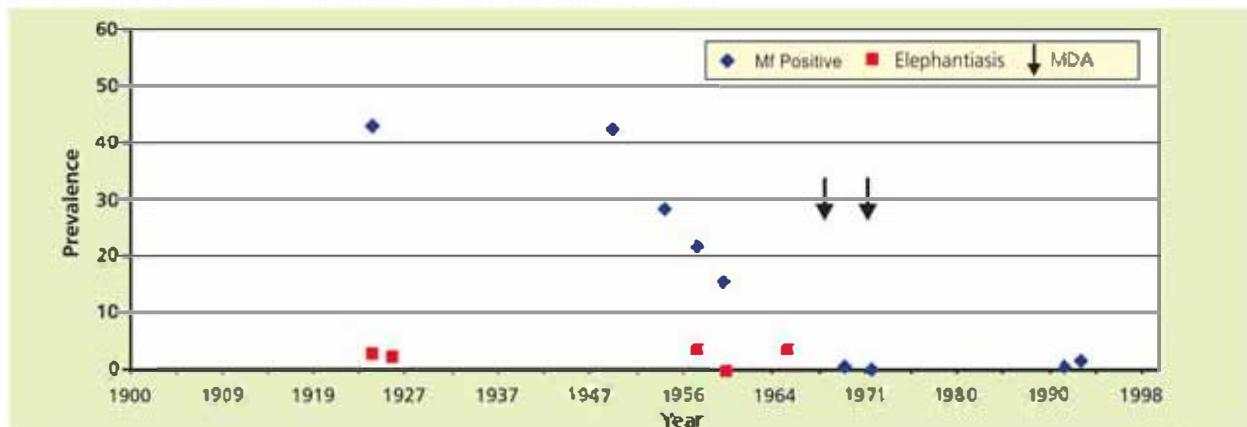
Source: Country Health Information Profile 2004 (WHO Regional Office for the Western Pacific), the Secretariat of the Pacific Community (SPC), Lonely Planet Destinations



Source: WorldClimate.  
Temperature: Rarotonga 1907 to 1991  
Rainfall: Rarotonga 1899 and 1990

Source: Secretariat of the Pacific Community, 2000

## 3 Filariasis before PacELF, 1900–1998



## The PacELF Way Towards the Elimination of Lymphatic Filariasis in the Pacific

### Country Filariasis Activities in the 1900s before PacELF

#### Microfilaria Prevalence and Clinical Surveys

##### Southern Cook Islands

Population/Area	Date	% Mf pos (n)	Noted Clinical Features % (n)	Primary Reference
Rarotonga	1925	40.1 (197)	Elephantiasis: 2.0 (197)	McKenzie A (1925)
Aitutaki	1925	50.7 (71)	Elephantiasis: 5.6 (71)	McKenzie A (1925)
Atiu	1926		Elephantiasis: 2.4 (800)	Lambert SM (1926)
Mauke Island	1926		Elephantiasis: 4.1 (560)	Lambert SM (1926)
Mitiaro	1926		Elephantiasis: 0.0 (180)	Lambert SM (1926)
Nationwide	1926	98.0 (45) pos at night 90.0 (41.2) pos at day		Lambert SM (1926)
age > 9: Aitutaki	1949	42.5 (240)		Davis TA (1949)
Rarotonga	1957	23.3 (554)	Elephantiasis: 4.3 (554)	Iyengar MT (1957)
Aitutaki	1957	20.9 (1297)	Elephantiasis: 3.7 (1297)	Iyengar MT (1957)
Aitutaki	1969	0.8 (2492)		WHO/SPC (1974)
Aitutaki	1971	0.2 (2600)		WHO/SPC (1974)
Rarotonga outpatients	1991	0.9 (5868)		Country data
Rarotonga outpatients	1992	1.0 (2664)		Country data
Aitutaki	1992	3.3 (1370)		Country data

##### Northern Cook Islands

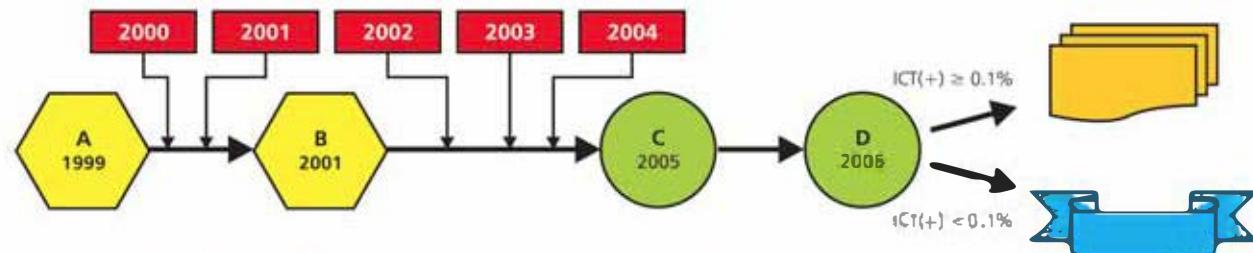
Population/Area	Date	%MF pos (n)	Noted Clinical Features % (n)	Primary Reference
Pukapuka	1954	28.4 (498)	Elephantiasis: 3.8 (498)	New Zealand Medical Research Report (1954)
Pukapuka	1959	29.4 (218)		McCarthy DD (1959)
Penroman	1959	5.8 (274)	Elephantiasis: 0.0 (274)	McCarthy DD (1959)
Rakahanga	1959	8.4 (226)	Elephantiasis: 0.0 (226)	McCarthy DD (1959)
Palmerston	1959	8.7 (69)	Elephantiasis: 0.0 (69)	McCarthy DD (1959)
Manihiki	1959	19.7 (371)	Elephantiasis: 0.0 (371)	McCarthy DD (1959)

#### Mass Drug Administration or Other Control Measures

Population/Area	Date	Activity	Details	Primary Reference
Aitutaki	1968	MDA		WHO/SPC (1974)
Aitutaki	1971	MDA		WHO/SPC (1974)

## 4 PacELF Activity

### PacELF Country Plan



Type	Year	Sampling	Target	Result
<b>A</b>	1999	Convenience	Nationwide (9 islands)	ICT 8.6% (162/1884)
<b>B</b>	2001	Cluster	Sentinel sites	ICT 7.6% (35/460)
<b>C</b>	2005	Cluster	Stratified survey by island group and sentinel sites Aitutaki, Mitiaro, Pukapuka, Rarotonga	
<b>D</b>	2006	Complete	460 children all 5- to 6-year-old children	

Source: PacMAN Book 2004



## Distribution Dose of DEC and Albendazole Tablets

Body Weight (kg)	No. of DEC (50 mg) tablets	No. of albendazole (400 mg) tablets	Body Weight (kg)	No. of DEC (50 mg) tablets	No. of albendazole (400 mg) tablets
<9	1	1	70-74	8	1
10-14	1	1	75-79	9	1
15-19	2	1	80-84	9	1
20-24	2	1	85-89	10	1
25-29	3	1	90-94	11	1
30-34	3	1	95-99	11	1
35-39	4	1	100-104	12	1
40-44	5	1	105-109	13	1
45-49	5	1	110-114	13	1
50-54	6	1	115-119	14	1
55-59	7	1	120-125	14	1
60-64	7	1	124-129	15	1
65-69	8	1	130 over	16	1

## **Registration Form**

FEC Materials

**FILARIASIS**

**ELIMINATE FILARIASIS**

**Public Health Department**

**Leaflet**



The PacELF Way Towards the Elimination of Lymphatic Filariasis in the Pacific

**Distribution Dose of DEC and Albendazole Tablets**

Body Weight (kg)	No. of DEC (50 mg) tablets	No. of albendazole (400 mg) tablets	Body Weight (kg)	No. of DEC (50 mg) tablets	No. of albendazole (400 mg) tablets
<9	1	1	70–74	8	1
10–14	1	1	75–79	9	1
15–19	2	1	80–84	9	1
20–24	2	1	85–89	10	1
25–29	3	1	90–94	11	1
30–34	3	1	95–99	11	1
35–39	4	1	100–104	12	1
40–44	5	1	105–109	13	1
45–49	5	1	110–114	13	1
50–54	6	1	115–119	14	1
55–59	7	1	120–125	14	1
60–64	7	1	124–129	15	1
65–69	8	1	130 over	16	1

**Registration Form**

FILARIASIS PAUA REGISTRATION FORM to the COOK ISLANDS							
Name:		Age	Sex	Weight	Address	Post Office	DEC attendance
No.	Name:				Village:	DEC	albendazole
1						Preg.	Sick
2						Baby	Old
3							other reasons
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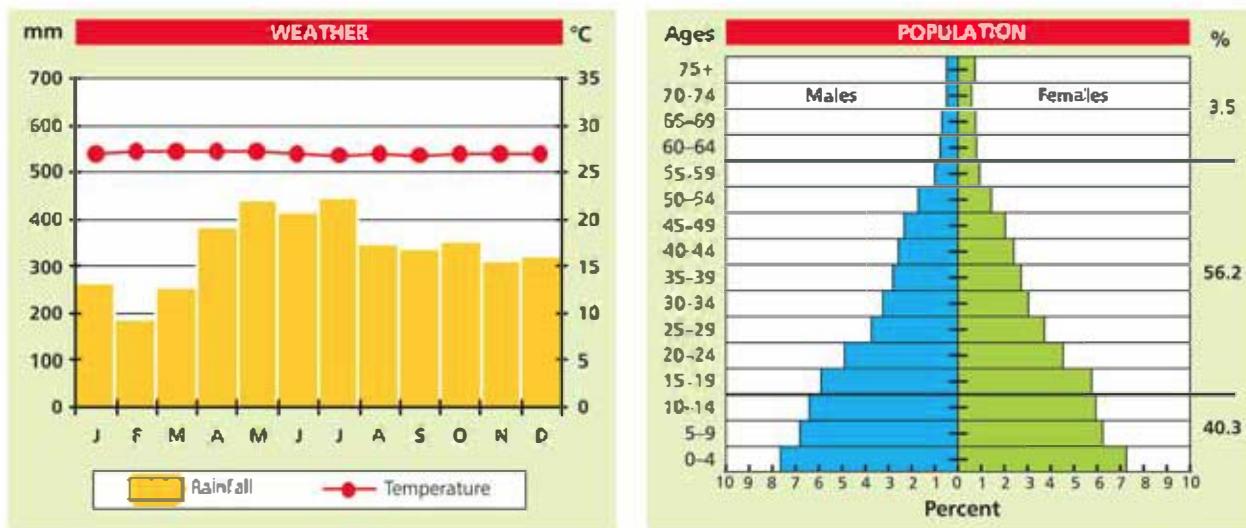
**Operational Staff:** Public health nurse, health inspector



## General Information

Capital city	Palikir
Number of islands	607
Land area	701 sq km
Languages	Pohnpeian, Yapese, Chuukese, Kosraea, English
People	Micronesians, Polynesians, expats
Gross domestic product (GDP) per capita	\$2000 (1999 est.)
Economy	Copra, fishing, tourism, most earnings come from US aid
Total population by census (2000)	107 008
Population estimated (2004)	112 700
Population density (people/km <sup>2</sup> )	161
Infant mortality rate (per 1000 live births) (2000)	40
Maternal mortality rate (per 100 000 live births) (2002)	317 (based on childbearing age 15–44 years old)
Life expectancy at birth (2000)	67.0
Leading causes of mortality (2003)	Diseases of the circulatory system, Non-communicable diseases of the respiratory system, endocrine, nutritional and metabolic disease, Infectious and parasitic diseases

Source: Country Health Information Profile 2004 (WHO Regional Office for the Western Pacific), the Secretariat of the Pacific Community (SPC), Lonely Planet Destinations



Source: World Climate  
Temperature: Pohnpei WHO 1961 and 1990,  
Rainfall: Ponape 1967 and 1995

Source: Secretariat of the Pacific Community, 2000

## 2 Country Profile

### Filariasis Type and Vectors

Filariasis latest status	Partially endemic
Filaria type	<i>Wuchereria bancrofti</i>
Mosquito vectors	<i>Culex quinquefasciatus</i>

Source: Culicidae of the Australasian Region, Volume 12, 1989.



**Federated States of Micronesia**

Source: MapQuest.com

### Coat of Arms



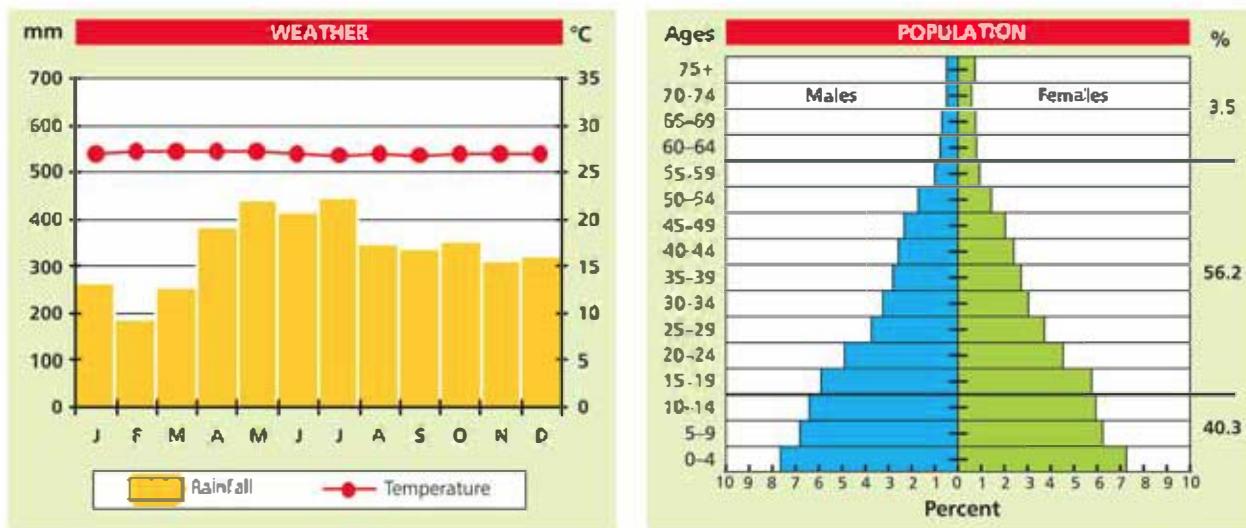
Source: Wikipedia



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Source: Country Health Information Profile 2004 (WHO Regional Office for the Western Pacific), the Secretariat of the Pacific Community (SPC), Lonely Planet Destinations

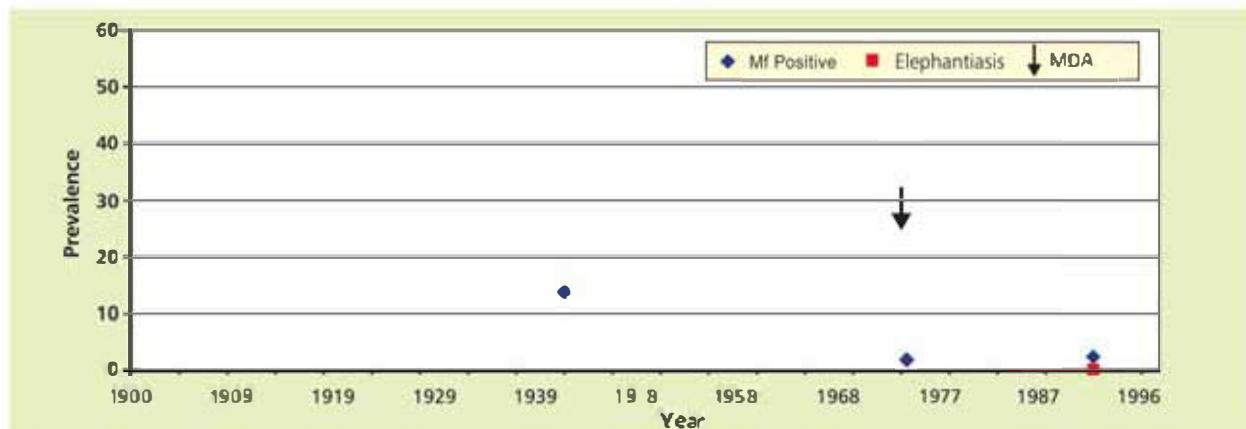


Source: World Climate  
temperature: Pohnpei WHO 1961 and 1990,  
rainfall: Ponape 1967 and 1995

Source: Secretariat of the Pacific Community, 2000



### 3 Filariasis before PacELF, 1900–1996



#### Country Filariasis Activities in the 1900s before PacELF

##### Microfilaria Prevalence and Clinical Surveys

Population/Area	Date	% Mf pos (n)	Noted Clinical Features % (n)	Primary Reference
Yap District	1943	12.6 (943)	-	Pipkin AC (1953)
Truk District	1943	22.5 (947)	-	Pipkin AC (1953)
Ponape District	1943	3.2 (647)	-	Pipkin AC (1953)
Yap; 10 islands	1974	2.2 (1414)	-	Country data
14 villages; 9 islands in Chuuk	1992	2.6 (2193)	-	Kimura et al (1994)
age > 14 yrs; males; Chuuk	1992	-	Elephantiasis: 0.4 (466), Hydrocoele: 3.4 (466)	Kimura et al (1994)



##### Mass Drug Administration or Other Control Measures

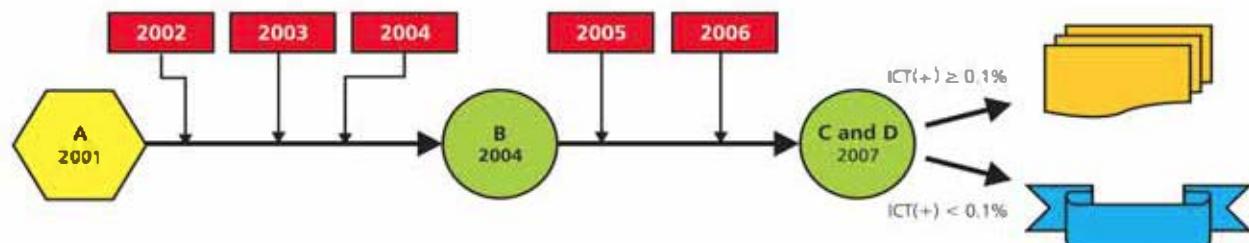
Population/Area	Date	Activity	Details	Primary Reference
Yap	1974	MDA	Hetrazan (DEC), 865 treated (14140)	Country data

## 4 PacELF Activity

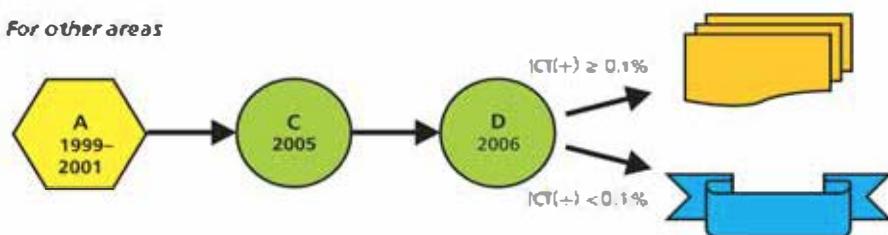
### 4 PacELF Activity

#### PacELF Country Plan

For Satawal Island



For other areas



Type	Year	Sampling	Target	Result
A	1999–2001	Convenience	Chuuk - Yap	ICT 0.2% (5/2392)
	2002	Convenience	Satawal, 8–15 year school children	ICT 1.9% (19/971)
	2002	Convenience	Pohnpei students	ICT 0% (0/1000)
B	2004	Cluster	Sentinel sites	
C	2007	Cluster	Satawal	
D	2008	LQAS	3000 children	

Source: PacMAN Book 2004

#### Results of Blood Surveys and MDAs under PacELF

##### Blood Surveys

Date	Method	Target	Sampling	No. examined	No. of positives	Positive rate (%)	Remarks	Reference
Nov99-Apr00	ICT	Chuuk (12 Islands)	convenience sample	2186	4	0.2		Presentation in AM3
Mar 01	ICT	Students (16 schools) in Pohnpei	convenience sample	716	0	0		Report of Pohnpei state (Mar-01)
Oct–Nov01	ICT	Yap state		921	1	0.1		Presentation in AM6
Oct–Nov01	ICT	8–15 y.o. school children in Satawal area	convenience sample	50	19	38.0		Presentation in AM6
2003	ICT	Satawal area	convenience sample	266	91	34.2		Presentation in AM6
2003	ICT	Tamatam area	convenience sample	100	2	2.0		Presentation in AM6

##### Targeted MDAs

Year	MDA	Reported population	Estimated population*	Registered population	% Registered	Treated population	% Treated / Reported	% Treated / Estimated*	% Treated / Registered	Reference
2003	Targeted MDA	507	507			507	100	100	100	Presentation in AM6

\*Estimated assuming constant growth rate between latest census and 2004 population estimate (SPC)



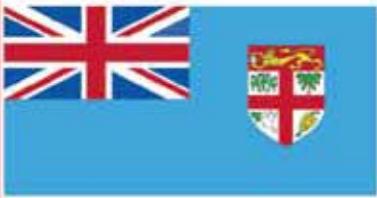
**Supplies Shipped from PacELF, 2000–2004**

Year	2000	2001	2002	2003	2004
ALB (tablets)	-	-	1000	-	10 000
DEC (tablets)	-	-	10 000	-	350 000
ICT (test cards)	-	5000	-	3000	3000

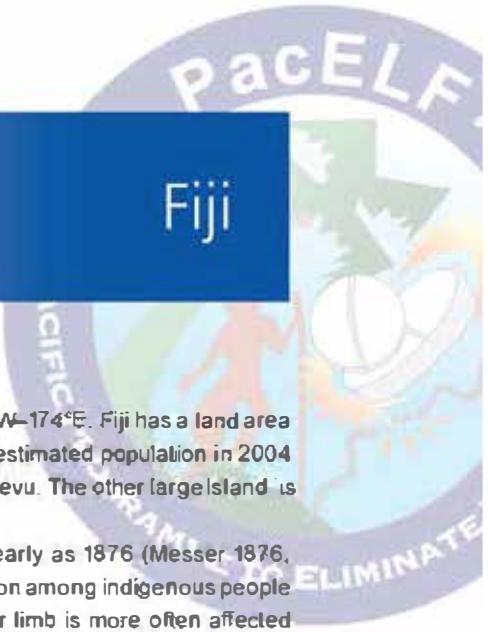
**Partnership:** WHO, GSK (albendazole), JICA (DEC, ICT), CDC (epidemiologist)

**Operational Staff:** Public health nurse, health inspector, laboratory staff





Fiji



## 1 Summary

The 322 islands of Fiji are located between 12°–22°S and 177°W–174°E. Fiji has a land area of 18 272 sq km and a population of 775 077 (1996 census). The estimated population in 2004 was 836 000 (SPC 2004). The capital is Suva, on the island of Viti Levu. The other large island is Vanua Levu.

The common occurrence of elephantiasis was described as early as 1876 (Messer 1876, quoted in Sasa 1976). Messer noted: "Elephantiasis is very common among indigenous people in certain localities, especially in low and marshy parts. The lower limb is more often affected than the scrotum."

Opportunistic testing of patients at the Colonial Hospital was carried out by Lynch (1905), who found Mf-positive cases in 25.7% of 608 people tested. People from 15 different provinces were positive, and the rates were highest in those from Kadavu (35.5%). Similarly high Mf rates were reported by Bahr (1912) from villages in Viti Levu and the Lau group. Bahr also reported cases of elephantiasis from the Lau group, with rates as high as 8.7% in Lakeba. A nationwide survey of 57 000 people in 1956 found a 14.2% Mf rate (Nelson and Cruikshank 1956, quoted in Sasa 1976), 6.3% of people with enlarged lymph nodes, 6.6% with a history of filarial fever, and 3.8% with elephantiasis. In Vanua Levu much higher rates were found on the windward wet side than on the leeward dry side.

Control measures before the 1950s concentrated on vector control and village sanitation (cutting of grass and elimination of breeding sites). This was observed to reduce the number of mosquitoes but there was no evidence of any impact on filariasis transmission. In the 1950s there was some experimental use of hefrazan (DEC), which reduced the number of Mf circulating in peripheral blood (Symes 1956). There was a pilot MDA in 1961, followed by a nationwide MDA programme from 1969 to 1975, in which 5 mg/kg of the drug was given weekly in each area for six weeks, and then monthly for 22 months. Mf prevalence fell to less than 1% in all areas after the MDA, but by 1983 the Mf rate was increasing again in almost all areas. In some areas, Mf rates had returned to their original rates or higher.

From 1984 to 1991 a pilot project was carried out in three areas to compare the effectiveness of different drug regimens (country data, unpublished). Giving yearly doses for three years was shown to be most effective in reducing Mf rates, with levels having dropped to less than 1%. Surveys between 1991 and 1995 determined the overall prevalence of Mf to be 5.1%. In some places, Mf rates even higher than before the MDA were found, together with cases of lymph node enlargement, elephantiasis, and hydrocoele, which were seen nationwide (country data, unpublished).

Fiji joined PacELF in 1999. A nationwide baseline blood survey carried out on a sample of 5983 people in 2000–2001 showed 16.6% to be antigen-positive. A pre-MDA blood survey in 48 villages in 2002 found 452 antigen-positive cases (14.1%) and 203 Mf cases (6.3%) out of 3214 people examined.

An MDA using DEC (6 mg/kg) and albendazole (400 mg) began in 2002 under PacELF. The first MDA covered 546 922 people, for a reported coverage of 70.5%. The second MDA in 2003 treated 483 983 people (reported coverage of 62.4%), and the third MDA in 2004 treated 537 484 (reported coverage of 69.2%). Blood surveys in 2004 in 14 villages found 152 out of 667 people (22.8%) to be antigen-positive, and 35 out of 646 people (5.4%) to be Mf-positive.

## 2 Country Profile

### Filariasis Type and Vectors

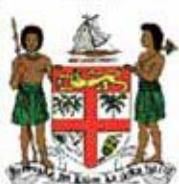
<b>Filariasis latest status</b>	Endemic
<b>Filaria type</b>	<i>Wuchereria bancrofti</i> Diurnally sub-periodic
<b>Mosquito vectors</b>	<i>Aedes psudoscutellaris</i> <i>Aedes horrescens</i> <i>Aedes rotumae</i> <i>Aedes fijiensis</i> <i>Aedes polynesiensis</i>

Source: Culicidae of the Australasian Region, Volume 12, 1989



Source: MapQuest.com

### Coat of Arms



Source: Wikipedia

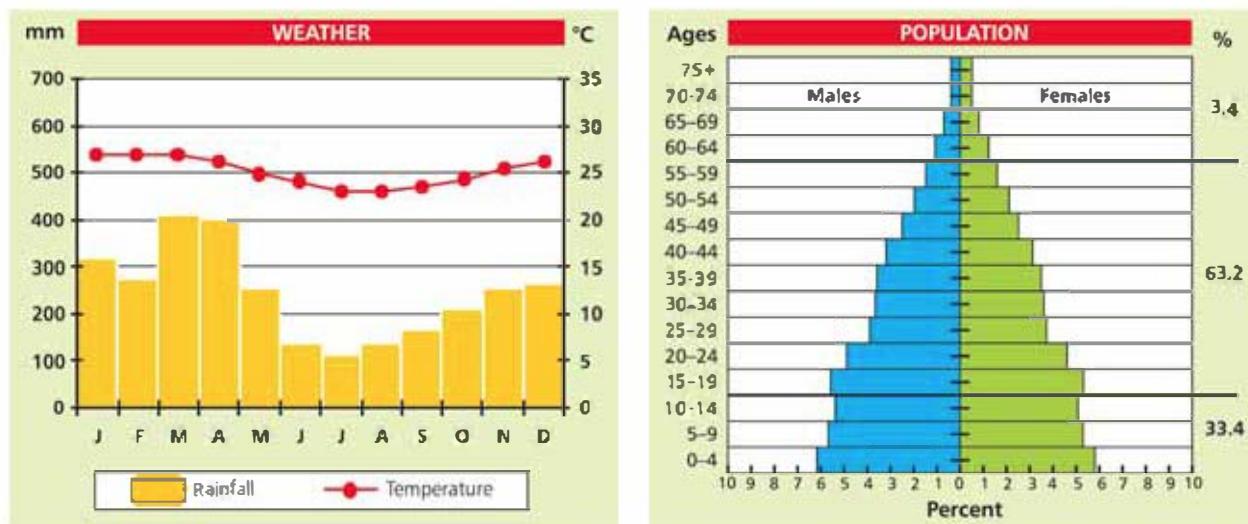


## The PacELF Way Towards the Elimination of Lymphatic Filariasis in the Pacific

### General Information

Capital city	Suva
Number of islands	322
Land area	18 333 sq km
Languages	Fijian, Hindi, English
People (199 )	Fijian (51%); Indian (44%); European, other Pacific Islanders, overseas Chinese, and other (5%)
Gross domestic product (GDP) per capita	\$2000
Economy	Sugar, tourism, mining of gold, fish, lumber, and clothing
Total population by census (1996)	775 077
Population estimated (2004)	836 000
Population density (people/km <sup>2</sup> )	46
Infant mortality rate (per 1000 live births) (2002)	17.76
Maternal mortality rate (per 100 000 live births) (2002)	35.29
Life expectancy at birth (2000)	66.6
Leading causes of mortality (2003)	Circulatory disease, respiratory disease, infectious and parasitic disease, neoplasm, injury, and poisoning

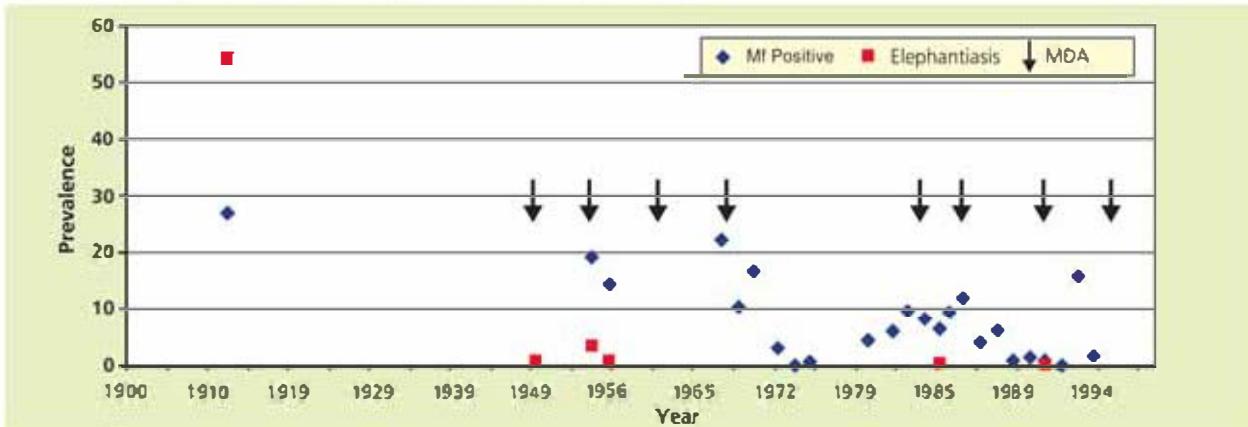
Source: Country Health Information Profile 2004 (WHO Regional Office for the Western Pacific), the Secretariat of the Pacific Community (SPC), Lonely Planet Destinations



Source: WorldClimate.  
Temperature: Lauca Is Bay 1921 to 1981.  
Rainfall: Neuson 1971 and 1990

Source: Secretariat of the Pacific Community, 2000

### 3 Filariasis before PacELF, 1900–1994



## Country Filariasis Activities in the 1900's before PacELF

### Microfilaria Prevalence and Clinical Surveys

Population/Area	Date	% Mf pos (n)	Noted Clinical Features % (n)	Primary Reference
Nationwide	1912	27.1 (1320)	Elephantiasis: 55.5 (1320)	Bahr PH (1912)
Europeans	1912	17.1 (35)	Filarial Disease: 14.3 (35)	Bahr PH (1912)
Nationwide	Pre-1949		Elephantiasis: 0.9 (57 888)	Sykes CB (1960)
Nationwide (8 areas)	1954-1956	19.8 (1804)		Ministry of Health (1996)
Nationwide (Viti Levu, Taveuni, Savusavu, Labasa)	1954-1956	19.5 (1976)		Sykes CB (1960)
Nationwide (Viti Levu, Taveuni, Savusavu, Labasa)	1954-1956	18.2 (2142)	Elephantiasis: 3.4 (2142), Crotum: 0.9 (2142), Fever with lymphangitis: 5.4 (2142), Enlargement of lymph nodes: 5.2 (2142)	Sykes CB (1960)
Nationwide (Viti Levu, Taveuni, Savusavu, Labasa)	1954-1956		Hydrocoele: 1.1 (1748), Filaria fever: 6.6 (1748), Enlargement of lymph nodes: 6.3 (110/1748)	Sykes CB (1960)
Nationwide	1956	14.2 (5788)	Elephantiasis: 0.9 (5788)	Nelson S, Cruikshank JM (1955)
Taveuni/ Koro	1968	23.1 (947)		Ministry of Health (1996)
Savusavu	1968	18.9 (1324)		Ministry of Health (1996)
Rotuma	1968	29.4 (528)		Ministry of Health (1996)
Macuata/Bua	1969	7.6 (1437)		Ministry of Health (1996)
Lau	1969	13.8 (984)		Ministry of Health (1996)
Kadavu	1970	11.9 (388)		Ministry of Health (1996)
Lomaiviti	1970	18.5 (902)		Ministry of Health (1996)
Rotuma	1972	2.9 (2015)		Ministry of Health (1996)
Kadavu	1973	0.1 (3124)		Ministry of Health (1996)
Taveuni/ Koro	1974	0.5 (1103)		Ministry of Health (1996)
Savusavu	1974	0.9 (349)		Ministry of Health (1996)
Lau	1974	0.3 (7499)		Ministry of Health (1996)
Rotuma	1974	3.9 (2347)		Ministry of Health (1996)
Lomaiviti	1974	0.3 (3686)		Ministry of Health (1996)
Lau	1980	4.4 (721)		Ministry of Health (1996)
Kadavu	1982	5.8 (1561)		Ministry of Health (1996)
Lau	1983	6.8 (3843)		Ministry of Health (1996)
Rotuma	1983	21.1 (1718)		Ministry of Health (1996)
Lomaiviti	1983	5.7 (2394)		Ministry of Health (1996)
Lau	1984	8.1 (2447)		Ministry of Health (1996)
Kadavu	1985	6.3 (5792)		Ministry of Health (1996)
Savusavu (Nagigi)	1985	9.2 (184)		Ministry of Health (1996)
Kadavu and Lomaiviti	1985-1986		Elephantiasis: 0.5 (5601), Hydrocoele: 2.1 (5601), Filaria fever: 2.3 (5601), Enlargement of Epitrochlear glands: 14.5 (5601), Enlarged inguinal nodes: 41.1 (5601)	Ministry of Health (1996)
Lomaiviti	1986	11.6 (4611)		Ministry of Health (1996)
Kadavu	1987	4.1 (3257)		Mataika JU et al (1998)
Kadavu	1988	2.3 (2819)		Mataika JU et al (1998)
Rotuma	1988	11.1 (2284)		Ministry of Health (1996)
Kadavu	1989	1.6 (2967)		Mataika JU et al (1998)
Lomaiviti	1989	0.6 (2654)		Ministry of Health (1996)
Kadavu	1990	1.3 (2830)		Mataika JU et al (1998)
Kadavu and Lomaiviti	1990		Elephantiasis: 0.1 (5601), Hydrocoele: 1.8 (5601), Filaria fever: 0.6 (5601), Enlargement of Epitrochlear glands: 5.9 (5601), Enlarged inguinal nodes: 28.9 (5601)	Ministry of Health (1996)
Kadavu	1990-1991	0.7 (2611)		Mataika JU et al (1998)
Savusavu	1991	3.4 (1811)		Ministry of Health (1996)
Macuata	1991	0.6 (1728)		Ministry of Health (1996)



### The PacELF Way Towards the Elimination of Lymphatic Filariasis in the Pacific

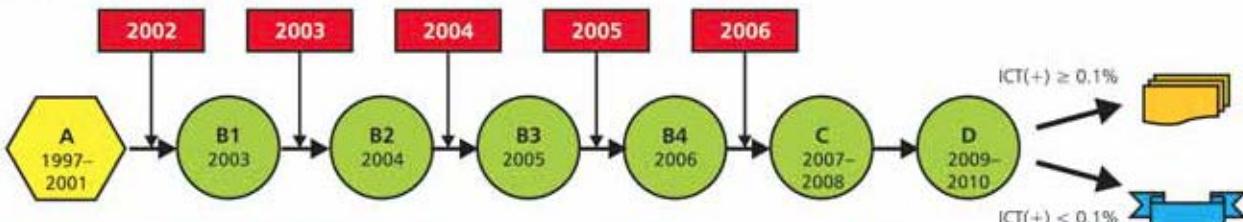
Population/Area	Date	% Mf pos (n)	Noted Clinical Features % (n)	Primary Reference
Lomaiviti	1991	0.9 (2704)		Ministry of Health (1996)
Nationwide	1991–1996	5.1 (31 877)		Ministry of Health (1996)
Nationwide; Indians only	1991–1993	0.0 (825)		Ministry of Health (1996)
Nationwide	1991–1995		Elephantiasis: 0.2 (18 253), Hydrocoele: 0.9 (18 253), Lymph node enlargement: 16.1 (18 253)	Ministry of Health (1996)
Rotuma	1993	15.7 (1854)		Ministry of Health (1996)
Kadavu	1994	1.5 (392)		Ministry of Health (1996)
Lau	1994–1995	5.1 (3449)		Ministry of Health (1996)

### Mass Drug Administration or Other Control Measures

Population/Area	Date	Activity	Details	Primary Reference
Nationwide	Pre-1949	Vector Control and Village Sanitation	Cutting grass and elimination of breeding sites	Symes CB (1960)
	1950s	MDA	Experimental use of Hexazin (DEC)	Symes CB (1960)
Rewa	1961	MDA	6 mg/kg DEC given: a total dose of 72 mg/kg over a period of one year	Burnett GF, Mataika JU (1961)
Rewa	1962	MDA	6 mg/kg DEC given: a total dose of 72 mg/kg over a period of one year. Reduction MF Pos: 12.1 to 2.7 (91); MF Density 4.1 to 0.4	Burnett GF, Mataika JU (1961)
Nationwide	1968–1969	DEC using various strategies		Ministry of Health (1996)
Pilot area	1984–1991	MDA	Pilot project comparing 2 different DEC regimens carried out. First area: DEC(6mg/kg) weight given annually X5yrs, Second area: DEC (5mg/kg) weekly X 6 then monthly X 22. Third area: Control area	Ministry of Health (1996)
Lomaiviti	1986–1988	DEC using various strategies		Ministry of Health (1996)
Kadavu	1986–1990	MDA	5 annual treatments of single dose DEC (6mg/kg)	Mataika JU et al (1998)
Eastern Division	1996	MDA	DEC (6mg/kg) and Ivermectin (200ug/kg)	Ministry of Health (1996)

## 4 PacELF Activity

### PacELF Country Plan



Type	Year	Sampling	Target	Result
A	1997–2001	Convenience	Sentinel sites all inhabitants	ICT 16.6% (993/5983)
B	each year	Convenience	Sentinel sites all inhabitants	
C	2007–2008	Cluster	Stratified survey by health subdivision	
D	2009–2010	Complete	21 000 children all 5- to 6-year-old children	

Source: PacMAN Book 2004

### Results of Blood Surveys and MDAs under PacELF

#### Blood Surveys

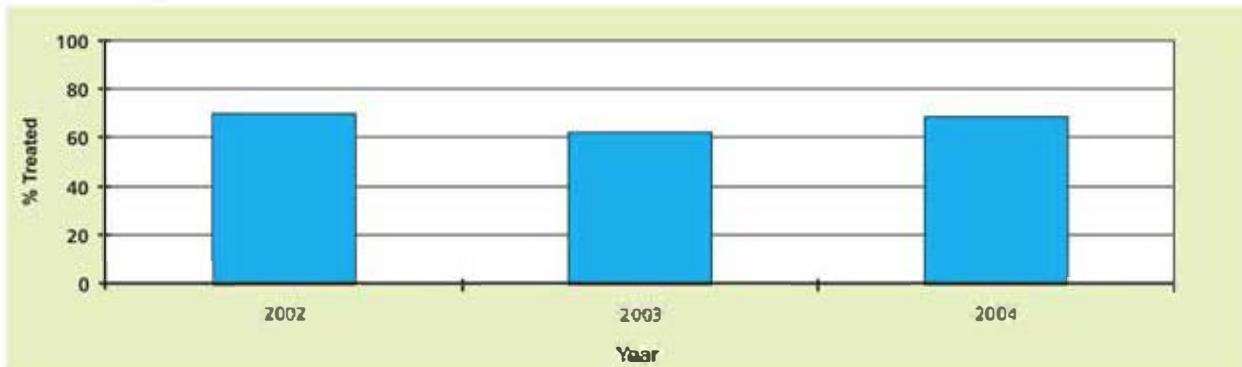
Date	Method	Target	Sampling	No. examined	No. of positives	Positive rate (%)	Remarks	Reference
1997, 2000–2001	ICT	Rotuma (97), Whole area	convenience sample	5983	993	16.6		MOH Report
2002	ICT	Sentinel Site (48 villages)	convenience sample	3214	452	14.1		MOH draft report
2002	Mf	Sentinel Site (48 villages)	convenience sample	3214	203	6.3	Pre-MDA	MOH draft report
2004	ICT	Sentinel Site (14 villages)	convenience sample	667	152	22.8	Pre-MDA	2004 blood survey report
2004	Mf	Sentinel Site (14 villages)	convenience sample	646	35	5.4		2004 blood survey report



**MDAs**

Year	MDA	Reported population	Estimated population*	Registered population	% Registered	Treated population	% Treated / Reported	% Treated / Estimated*	% Treated / Registered	Reference
2002	1st	776 173	820 769	575 486	74.1	546 922	70.5	66.6	95.0	Presentation in AMS
2003	2nd	776 173	828 385	510 255	65.7	483 983	62.4	58.4	94.9	Presentation in AM6
2004	3rd	776 173	836 000	546 467	70.4	537 484	69.2	64.3	98.4	Annual Report 2004

\*Estimated assuming constant growth rate between latest census and 2004 population estimate (CPC)

**MDA Coverage, 2002–2004****Supplies Shipped from PacELF, 2000–2004**

Year	2000	2001	2002	2003	2004
ALB (tablets)	-	868 000	170 000	980 000	930 000
DEC (tablets)	-	4 700 000	7 700 000	7 700 000	8 800 000
ICT (test cards)	-	5000	10 000	15 000	10 000

Partnership: WHO, GSK (albendazole), JICA (DEC and ICT), JOCV (volunteers)

**Distribution Dose of DEC and Albendazole Tablets**

Weight (kg)	No. of DEC (50 mg) tablets	No. of albendazole (400 mg) tablets	Body Weight (kg)	No. of DEC (50 mg) tablets	No. of albendazole (400 mg) tablets
10–13	1	1	24	2	1
14–22	2	1	59	3	1
23–29	3	1	10–14	5	1
30–38	4	1	15–19	7	1
39–46	5	1	20–49	9	1
47–52	6	1	50+	8	1
53–63	7	1			
64–71	8	1			
71–79	9	1			
80+	10	1			



Registration Form

Reg. No. _____			
<b>Fiji Filariasis Elimination Programme</b> <b>Mass Drug Administration: 2004</b> <b>National Target — 80%</b>			
Village/Settlement: Cenae Pagan (Loco TQ02)      2003: _____ 2004: _____ Municipality/City/Town/ Nursing Zone: Medical Area: Sub-Division: Division:			
Please Complete This Section Immediately after MDA			
Result	2002	2003	2004
Total Population Registered			
Total Population Treated			
Total Number of Tablets given (DEC)			
Total Number of Tablets given (ALB)			
No. 1 - Taken Immediately			
No. 2 - Taken 4-6hr			
Registered Coverage			
<i>Register TAKING (number) OF TABLETS</i>			
<i>...for the Elimination/Eradication of Lymphatic Filariasis in Fiji...</i>			

FIJI FILARIASIS PROGRAMME MASS DRUG TREATMENT FORM											
District:		Sub-District:		Village / Sett / Station:		Date:		Name:		Title:	
No.	Name	Sex	Age	DEC	ALB	DEC	ALB	DEC	ALB	DEC	ALB
1											
2											
3											
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Details Of Mass Drug Administration Diethylcarbamazine And Albendazole											
1. Diethylcarbamazine (DEC) is supplied in 50mg tablets. The number of tablets given to an individual is based on the living quota of being. The maximum number of tablets that can be given to one individual is 10 tablets.											
2. Albendazole is supplied in 150mg tablets. Only one tablet is given to each person.											
3. If a child has already taken eight tablets, only the remaining four tablets (4x 50 mg tablets) will be given.											
4. Prepare tablets for children over 2 years old. Give tablets to children over 2 years old in two doses. Give one dose immediately after MDA. Give another dose 12 hours later. Give the first dose at least 1 hour before the second dose.											
5. Give tablets to children under 2 years old. Give one dose immediately after MDA. Give another dose 12 hours later. Give the first dose at least 1 hour before the second dose.											
6. If a child has already taken eight tablets, only the remaining four tablets (4x 50 mg tablets) will be given.											
7. For those individuals that are allergic to DEC, give albendazole instead. For those individuals that are allergic to albendazole, give DEC instead.											
8. Mass administration of MDA can cause temporary side effects such as headache and abdominal cramps. If these side effects occur, advise the community to discontinue taking the drug or switch to DEC or albendazole. Advise the community to contact nearest Health facility if side effects continue.											
9. Diethylcarbamazine (DEC) and Albendazole are both orally given drugs. Diethylcarbamazine may cause local irritation of the mucous membranes when given orally. Advise the community to drink plenty of water when taking the drug. Advise the community to avoid taking the drug on an empty stomach. Advise the community to take the drug with food.											
10. Advise the community to avoid taking the drug on an empty stomach and immediately after the MDA. Advise the community to avoid taking the drug on an empty stomach and immediately after the MDA. Advise the community to avoid taking the drug on an empty stomach and immediately after the MDA.											

<b>Take your FILARIASIS tablets once a year until 2005</b>				
<b>take all tablets at once after meal</b>				
No.	Name	Age	DEC	ALB
1				
2				
3				
4				
5				
6				
7				
8				
9				
10				
The number of tablets to take is listed above. DEC is small tablets and ALB is the big one. Pregnant women & under 2 years old and very sick people are excluded from taking the FILARIASIS tablets. If you are infected with FILARIASIS, mild reactions sometimes occur, as a result of the worms being killed. For more information contact nearest Health facility				



## IEC Materials



Poster 2002



Calendar 2003

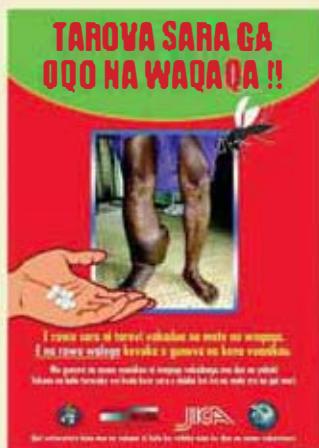
Poster 2003

Poster 2004

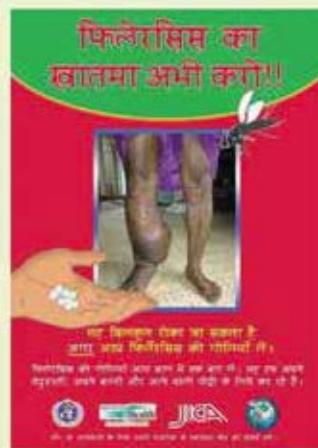




Poster 2003



Poster 2003 (Gijian)



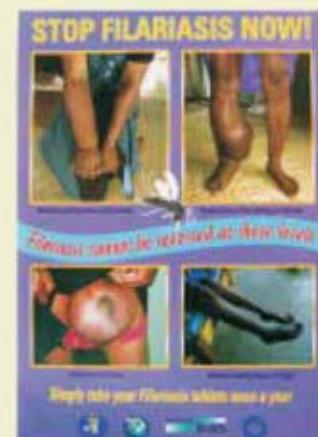
Poster 2003 (Hindi)



Pamphlet 2003



Pamphlet 2004



Pamphlet 2004



Sticker 2003



Pamphlet 2004



T-shirt 2002

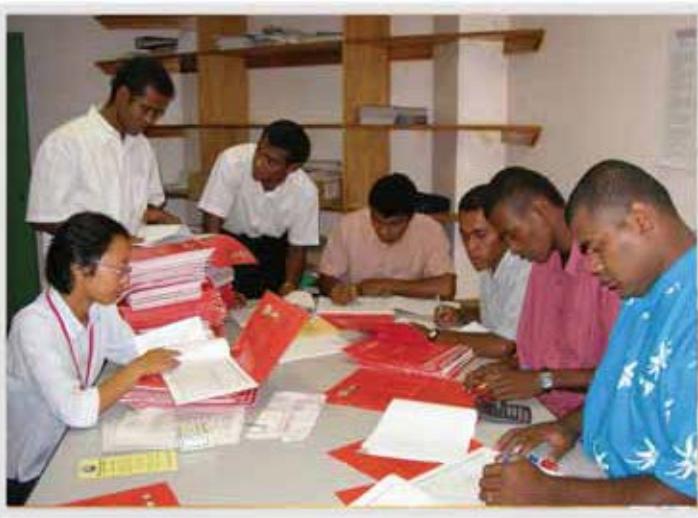


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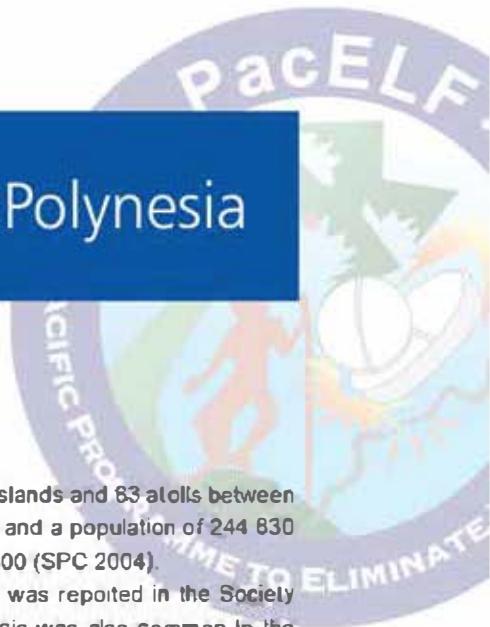
T-shirt 2004

**Operational Staff:** Filariasis unit, public health, laboratory staff





# French Polynesia



## 1 Summary

French Polynesia, a territory of France, consists of 35 islands and 83 atolls between 7°-29°S and 131°-156°W. It has a land area of 3521 sq km and a population of 244 830 (2002 census). The estimated population in 2004 was 250 500 (SPC 2004).

From the mid-1800s, high prevalence of elephantiasis was reported in the Society Islands (Lesson 1839, quoted in Ilengar 1965). Elephantiasis was also common in the Marquesas in the early 1900s (Buxton 1928) but was rare in both Tuamoto and the Austral Islands (Sasa 1976). Dubrueil (1909) reported on elephantiasis and its treatment while based at Papeete hospital from 1906 to 1909, noting that elephantiasis was not uniformly distributed, with the islands of Sous-le-Vent (Leeward Islands) being more affected than the Society Islands.

Until the 1960s, filariasis was a public health priority, as many surveys showed that Mf rates were often over 25%, with a large number of people suffering from clinical symptoms of filariasis (Sasa 1976). Since 1949, various control programmes have been conducted. The first of these was in Tahiti, where various MDA strategies using DEC were tested, resulting in a drop in Mf prevalence from 31.9% to 17.7% (Perolat et al. 1986). From 1950 to 1960, a DEC MDA campaign resulted in a decrease in Mf prevalence from 34% to 4%, and in Mf density in blood from 78 to 11 per 20 mm<sup>3</sup> of blood (WHO 1974).

Various campaigns had varying degrees of success. Blood surveys from the 1990s showed that although Mf levels were much lower than they had been at the start of the 20th century, they still remained as high as 10% in some areas (country data, unpublished). High prevalence in some areas despite prolonged treatment is thought to be due to a low compliance rate with MDA of 50-60% among adults, allowing active transmission to continue.

French Polynesia joined PacELF in 1999. A baseline blood survey with ICT antigen test kits on Tavaitoa and Tahuata in 2000 found 256 positive cases out of 1859 people examined (13.8%) (Dr Lam 2002, personal communication). French Polynesia is therefore considered an endemic country.

MDA using DEC (6 mg/kg) and albendazole (400 mg) began in 2000 under PacELF. So far, four annual rounds of MDA have been implemented since 2000. The reported MDA coverage rates have all been over 90%. The first MDA covered 205 000 people (93.2%) (first annual report). The second MDA in 2001 covered 214 149 people (95.1%) (second annual report). The third MDA in 2002 covered 211 052 people (93.3%) (third annual report). The fourth MDA in 2003 covered 221 300 people (90.1%) (country presentation at Fifth PacELF Annual Meeting, 2003). The fifth MDA in 2004 covered 230 737 people (92.8%) (country presentation at Sixth PacELF Annual Meeting, 2004).

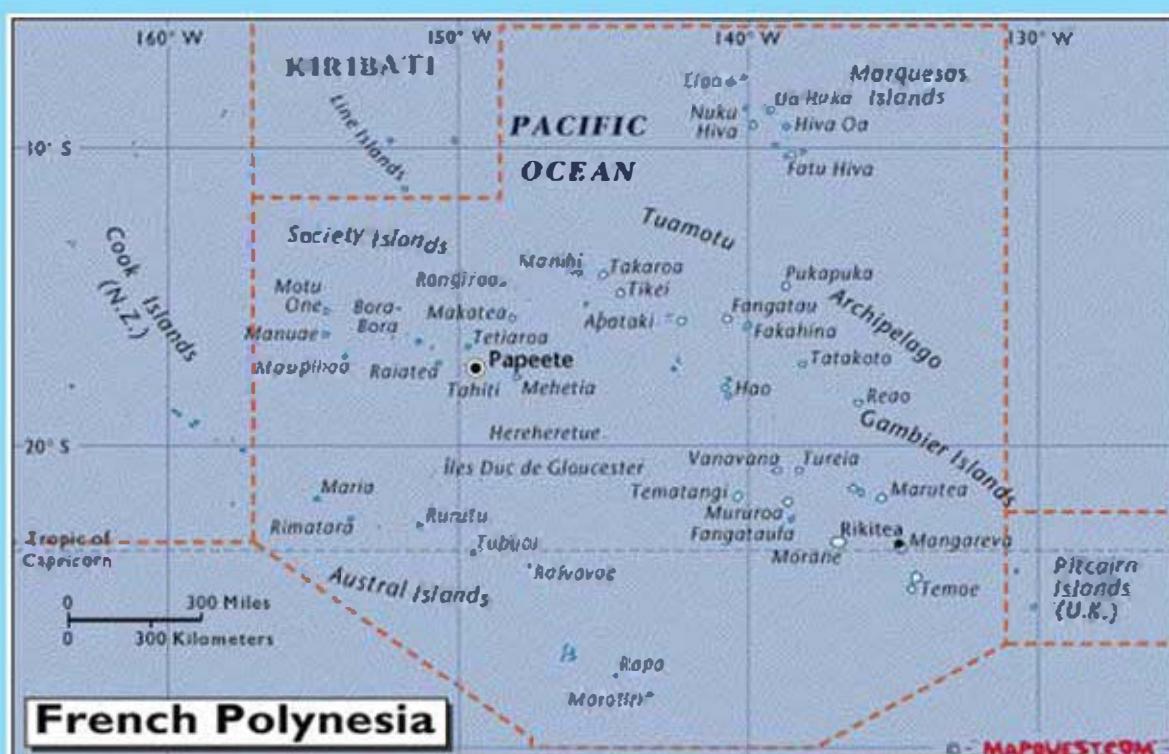
After the third MDA, a midterm survey on three islands in 2002-2003 (country presentation at Fifth PacELF Annual Meeting, 2003) found 42 antigen-positive cases out of 1069 people examined in Maupiti (3.9%), 169 positive cases out of 1220 people examined in Tavaitoa (13.9%), and 107 positive cases out of 635 people examined in Tahuata (16.9%).



## 2 Country Profile

### Filariasis Type and Vectors

<b>Filariasis latest status</b>	Endemic
<b>Filaria type</b>	<i>Wuchereria bancrofti</i>
<b>Mosquito vectors</b>	<i>Aedes polynesiensis</i>
	<i>Source: Culicidae of the Australasian Region, Volume 12, 1989</i>



Source: MapQuest.com

Coat of Arms



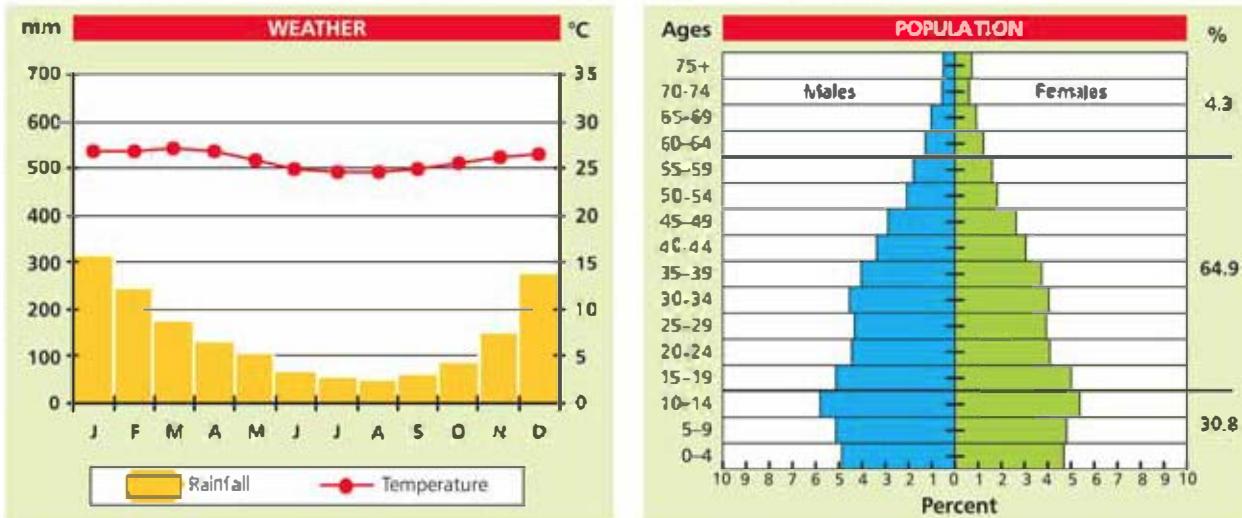
Source: Wikipedia



## General Information

Capital city	Pape'ete
Number of islands	35 islands and 83 atolls
Land area	3,521 sq km
Languages	Tahitian, French
People	Polynesians (Maohis - 83%), Europeans (12%), Asians (5%)
Gross domestic product (GDP) per capita	\$12 750
Economy	Tourism, pearls, agricultural processing, handicrafts, phosphates
Total population by census (2002)	244 830
Population estimated (2003)	250 500
Population density (people/km <sup>2</sup> )	71
Infant mortality rate (per 1000 live births) (2002)	6.7
Maternal mortality rate (per 100 000 live births)	Not available
Life expectancy at birth (1999)	73.0
Leading causes of mortality (2002)	Diseases of the circulatory system, neoplasms, injuries and external causes, symptoms, signs, and findings, not elsewhere classified, diseases of the respiratory system

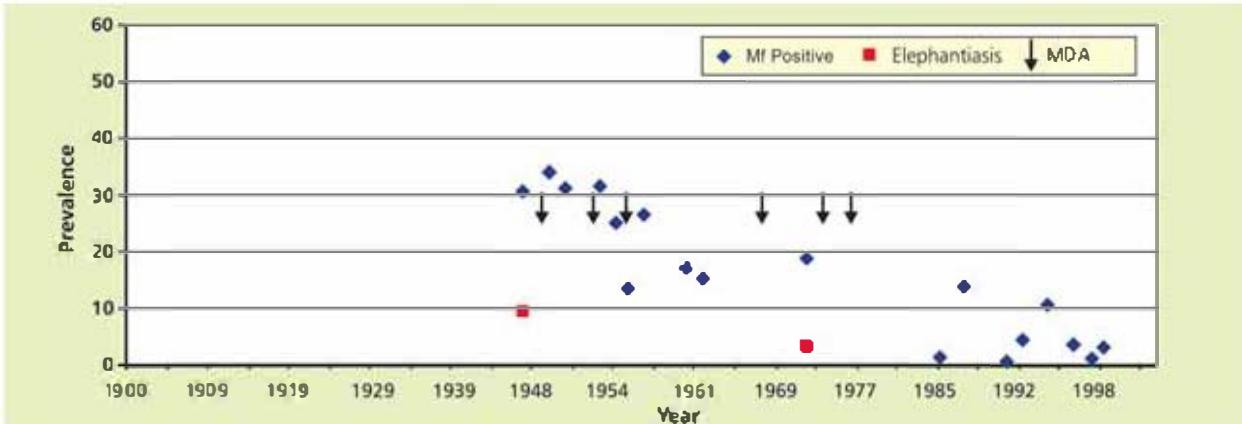
Source: Country Health Information Profile 2004 (WHO Regional Office for the Western Pacific), the Secretariat of the Pacific Community (SPC), Lonely Planet Destinations



Source: WorldClimate  
Temperature: Tahiti, 1976 and 1990,  
Rainfall: Pago Pago 1879 and 1989

Source: Secretariat of the Pacific Community, 2000

## 3 Filariasis before PacELF, 1900–1998



## Country Filariasis Activities in the 1900s before PacELF

### Microfilaria Prevalence and Clinical Surveys

Population/Area	Date	% Mf pos (n)	Noted Clinical Features % (n)	Primary Reference
age<5; Tahiti; Papeete	1947–1948	30.3 (916)	Elephantiasis: 9 (916) Lymphangitis: 18.8 (916) Noted Clinl al: 19.9 (916)	Galliar H, Millet R (1949)
Maiao	1949	27.7 (166)		Laigret JF (1959)
15 villages; Tahiti	1949	37.9 (3390)		March HN, Laigret J, Kessel JF, Bambridge B (1960)
15 villages; Tahiti	1949–1950	32.3 (8537)		Beye HK, Kessel JF, Heuls J et al. (1953)
Vairao	1950	30.9 (825)		Kessel JF (1971)
Tubuai	1953	19.1 (235)		Beye HK, Kessel JF, Heuls J et al. (1953)
Makatea	1953	41.6 (276)		Beye HK, Kessel JF, Heuls J et al. (1953)
Bora, Bora	1954	24.7 (230)		Laigret JF (1959)
Makatea and Tahiti	1955	9.7 (2390)		Rosen L (1955)
Tahiti; Papeete	1955	11.8 (13608)		Laigret JF (1959)
Moorea	1955	26.8 (2133)		Laigret JF (1959)
Raiatea	1956	20.5 (657)		Laigret JF (1959)
Huahine	1956	25.0 (304)		Laigret JF (1959)
Tahaa	1956	27.5 (342)		Laigret JF (1959)
Maupiti	1956	26.6 (514)		Laigret JF (1959)
Vairao	1956	30.9 (825)		Kessel JF (1971)
Marquesas	1960	17 (4227)		Lagraulet J, Barsinas M, Fagneau G et al. (1973)
Rimatara	1961–1962	11.1 (607)		Institut de Recherche Medicale de la Polynesie Francaise
Rurutu	1961–1962	15.5 (1281)		Institut de Recherche Medicale de la Polynesie Francaise
Tubuai	1961–1962	8.8 (927)		Institut de Recherche Medicale de la Polynesie Francaise
Raiivavae	1961–1962	22.8 (901)		Institut de Recherche Medicale de la Polynesie Francaise
Maupihi	1972	18.4 (2706)	Elephantiasis: 2.8 (2706) Lymphangitis: 3.6 (2706)	Lagraulet J, Pichon G, Oulun-Fabre D et al. (1972)
Rurutu	1985	1.0 (200)		Country plan 2002–2004
Huahine (Leeward Islands)	1987	15.0 (400)		Country plan 2002–2004
Bora	1987	10.0 (200)		Country plan 2002–2004
Raiivavae	1991	0 (20)		Country plan 2002–2004
Ua Pou	1992	4.0 (713)		Country plan 2002–2004
Raiatea	1994	10.0 (584)		Country plan 2002–2004
Tahaa	1996	3.0 (1978)		Country plan 2002–2004
Maupiti	1997	0.4 (990)		Country plan 2002–2004
Fatu Hiva	1997	3.0 (240)		Country plan 2002–2004
Maupiti	1998	0.2 (1000)		Country plan 2002–2004
Tahuata	1998	11.0 (280)		Country plan 2002–2004

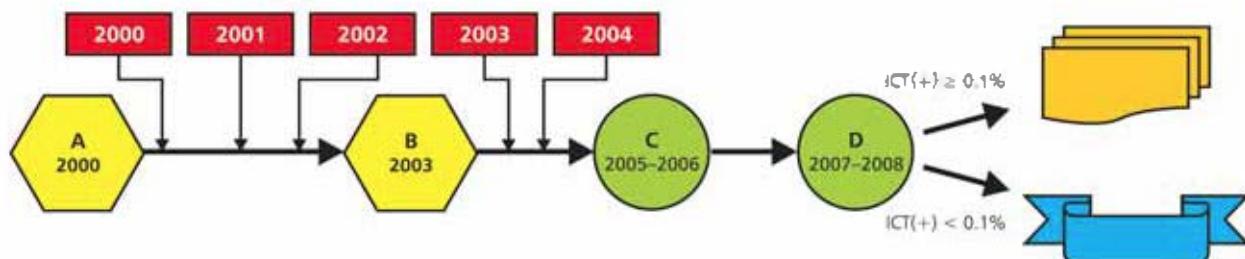
### Mass Drug Administration or Other Control Measures

Population/Area	Date	Activity	Details	Primary Reference
Mataiea, Tautira	1953–1954	DEC(6mg/kg) weight given monthly X2yrs	Total participating population: 1200	Kessel (1957)
Tahiti	1949–1953	Various doses of DEC and strategies tested		Perolat P Guidi C, Riviere F, Roux J (1986)
	1950–1960	DEC using various strategies		Thooris GC, Heuls J, Kessel JF, et al. (1956)
	1954–1955	DEC (3mg/kg) every month for 1 year		Perolat P Guidi C, Riviere F, Roux J (1986)
	1968–1973	Various MDA were tested. Finally MDA DEC (6mg/kg) every 6 months was used.		Perolat P Guidi C, Riviere F, Roux J (1986)
Maupiti	1974–1977	6mg/kg DEC, more than 90% coverage (of 600), 3 doses/year		WHO (1980)
Tahiti	1974–1977	2-1/2 doses of DEC		WHO (1980)
Moorea	1974–1977	7 doses (1 dose about every 5 months)		WHO (1980)
	1977–1984	2 strategies tested: a) limited MDA in vicinity of known carriers b) MDA with DEC (3mg/kg)		Perolat P Guidi C, Riviere F, Roux J (1986)



## 4 PacELF Activity

### PacELF Country Plan



Type	Year	Sampling	Target	Result
A	1997-2000	Cluster	Sentinel sites (3 endemic islands)	ICT: Maupiti 2.6% (24/993), Tevaitoa-Tahuata 13.8% (256/1859)
B	2003	Cluster	Sentinel sites all inhabitants	ICT 10.9% (318/2924)
C		Cluster	Stratified survey and sentinel sites	
D	2007-2008	LQAS	5,000 all 5- to 6-year-old children	

Source: PacMAN Book 2004

### Results of Blood Surveys and MDAs under PacELF

#### Blood Surveys

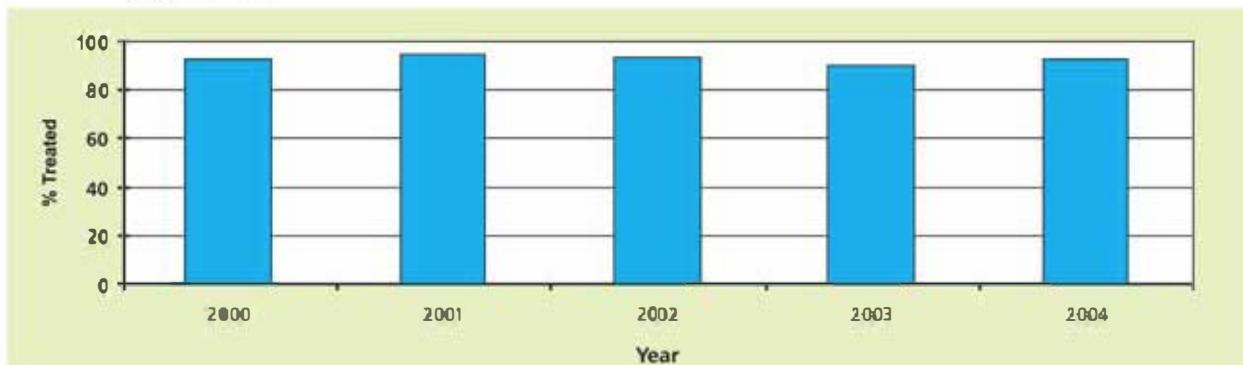
Date	Method	Target	Sampling	No. examined	No. of positives	Positive rate (%)	Remarks	Reference
2000	ICT	Sentinel Site (Tevaitoa-Tahuata)	convenience sample	1859	256	13.8		Presentation in AM5
Nov-02	ICT	Sentinel Site (Maupiti)	convenience sample	1069	42	3.9		Presentation in AM5
Feb-03	ICT	Sentinel Site (Tavaitoa)	convenience sample	1220	169	13.9		Presentation in AM5
Mar-03	ICT	Sentinel Site (Tahuata)	convenience sample	635	107	16.9		Presentation in AM5

#### MDAs

Year	MDA	Reported population	Estimated population*	Registered population	% Registered	Treated population	% Treated / Reported	% Treated / Estimated*	% Treated / Registered	Reference
2000	1st	220 000	239 160			205 000	93.2	85.7		Annual Report 2000
2001	2nd	225 300	241 995			214 149	95.1	88.5		Annual Report 2001
2002	3rd	226 172	244 830			211 052	93.3	86.2		Annual Report 2002
2003	4th	245 516	247 665			221 300	90.1	89.4		Presentation in AM5
2004	5th	248 776	250 500			230 737	92.7	92.1		Annual Report 2004

\*Estimated assuming constant growth rate between latest census and 2004 population estimate (SPC)

#### MDA Coverage, 2000-2004



**Supplies Shipped from PacELF, 2000–2004**

Year	2000	2001	2002	2003	2004
ALB (tablets)	220 000	-	250 000	240 000	247 300
DEC (tablets)	740 000	-	-	-	-
ICT (test cards)	-	-	1000	-	-

**Partnership:** WHO, GSK (albendazole), Institut Louis Malardé (technical assistance)

**Distribution Dose of DEC and Albendazole Tablets**

Weight (for adult), Age (for school children)

DEC and albendazole doses depending on age and weight

Age and Weight	DEC	albendazole (400 mg)
2–5 years (pre-school)	1 x 100 mg tablet	1
5–11 years (primary)	2 x 100 mg tablet	1
12–16 years (secondary)	3 x 100 mg tablet	1
Adult < 80 kg	4 x 100 mg tablet	1
Adult > 80 kg	6 x 100 mg tablet	1

**IEC Materials**



**Operational staff:** Public health medical staff, Institut Louis Malardé





# Guam



## 1 Summary

Guam is an unincorporated self-governing US territory island located at 13°N and 144°E. It has a land area of 541 sq km and a population of 154 805 (2000). The population in 2004 was estimated at 166 100 (SPC 2004). The capital is Agana.

The first study in Guam of 244 people in Ynarajan village on the southeast coast found the prevalence of lymphatic filariasis to be 5.3% (Crow 1910). No evidence of filariasis infection was found in the 1940s and 1950s (Pipkin 1953, Sosa 1976); the Ynarajan focus had disappeared.

Records do not indicate the presence of *W. bancrofti* on the island of Guam (WHO/SPC 1974). Two imported cases were reported in 1991 and 1999 (one case each).

In 1999, Guam joined PacELF. The most recent antigen prevalence survey was done in 2001 (Ministry of Health); all 980 people tested in 19 villages were found negative by ICT. Guam is therefore classified as a non-endemic territory. There is no record of subsequent filariasis activities.



## 2 Country Profile

### Filariasis Type and Vectors

Filariasis latest status	Non-Endemic
Filaria type	<i>Wuchereria bancrofti</i>
Mosquito vectors	Nocturnally periodic <i>Culex quinquefasciatus</i>

Source: Culicidae of the Australasian Region, Volume 12, 1989



Source: MapQuest.com

### Coat of Arms



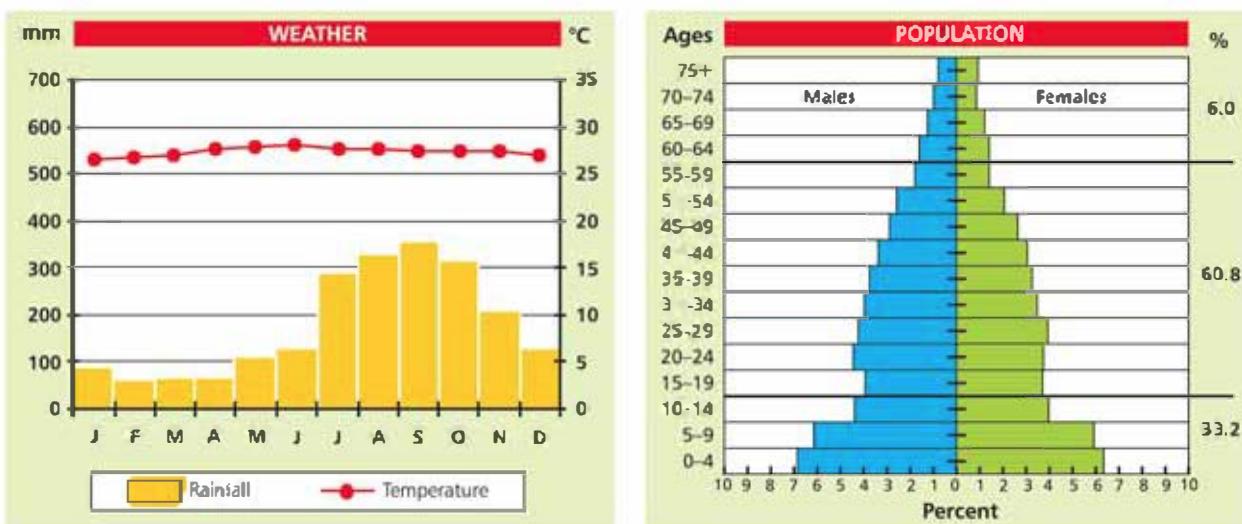
Source: Wikipedia



## General Information

Capital city	Agana
Number of islands	1
Land area	541 sq km
Languages	Chamorro, English
People	47% Chamorro, 25% Filipino, 10% Caucasian, Chinese, Japanese, Korean, and 18% other
Gross domestic product (GDP) per capita (2001)	\$10,872
Economy	Petroleum products, tourism, construction materials, fishing
Total population by census (2000)	154 805
Population estimated (2004)	166 100
Population density (people/km <sup>2</sup> )	307
Infant mortality rate (per 1000 live births) (2003)	11.22
Maternal mortality rate (per 100 000 live births)	Not available
Life expectancy at birth (2003)	77.8
Leading causes of mortality (2002)	Diseases of the heart, malignant neoplasm, cerebrovascular disease, all accidents, suicide

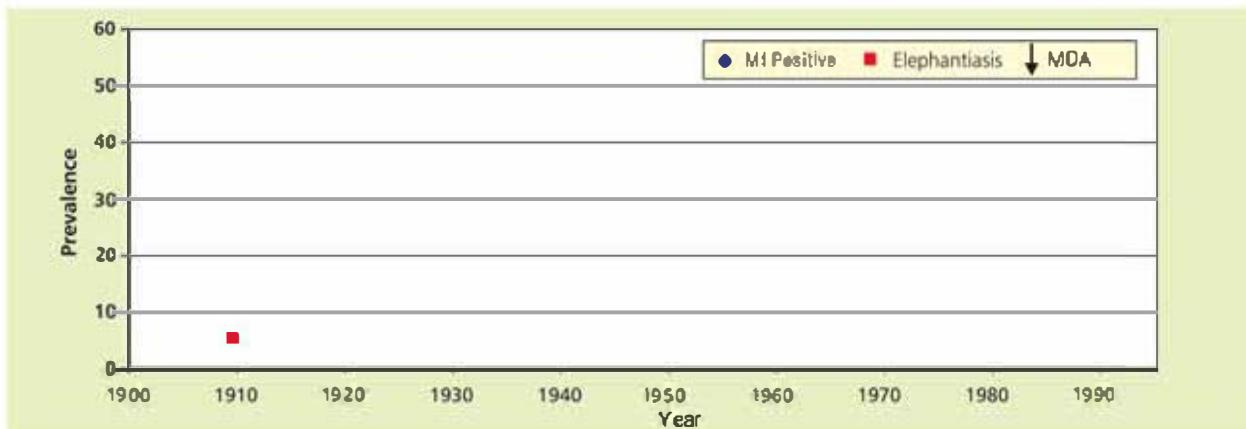
Source: Country Health Information Profile 2004 (WHO Regional Office for the Western Pacific), the Secretariat of the Pacific Community (SPC), Lonely Planet Destinations



Source: WorldClimate.  
Temperature: Agana 1921 to 1987.  
Rainfall: Agana 1905 to 1990

Source: Secretariat of the Pacific Community, 2000

### 3 Filariasis before PacELF, 1900–1990



#### Country Filariasis Activities in the 1900s before PacELF

##### Microfilaria Prevalence and Clinical Surveys

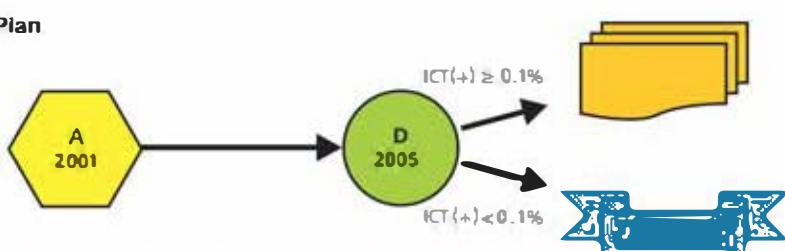
Population/Area	Date	% Mf pos (n)	Noted Clinical Features % (n)	Primary Reference
Ynarajan village	1910	5.3 (244)		Crow GB (1910)

##### Mass Drug Administration or Other Control Measures

Population/Area	Date	Activity	Details	Primary Reference
There are no records of control programs in the 1900s				

### 4 PacELF Activity

#### PacELF Country Plan



Type	Year	Sampling	Target	Result
A	2001	Convenience		ICT: 0%
D	2005	Complete	3800 all 5- to 6-year-old children	

Source: PacMAN Book 2004

#### Results of Blood Surveys and MDAs under PacELF

##### Blood Surveys

Date	Method	Target	Sampling	No. examined	No. of positives	Positive rate (%)	Remarks	Reference
May–Sept-2001	ICT	19 villages	convenience sample	980	0	0		Presentation in AM3



**Supplies Shipped from PacELF, 2000–2004**

Year	2000	2001	2002	2003	2004
ALB (tablets)	-	-	-	-	-
DEC (tablets)	-	-	-	-	-
ICT (test cards)	-	1000	-	-	-

**Partnership:** WHO

**Operational Staff:** Department of Public Health and Social Services





## Kiribati

### 1 Summary

Kiribati consists of 32 scattered islands located from 4°N to 11°S and 150°W to 169°E in three distinct groups: Gilbert (formerly known as the Gilbert Islands), Line Islands, and Phoenix. Kiribati has a land area of 810 sq km and a population of 84 494 (2000). The population in 2004 was estimated at 91 944 (MOH 2005). The capital is Tarawa.

The earliest records of filariasis in Kiribati describe the common occurrence of hydrocoele among males (Buxton 1928, Knott 1944 unpublished quoted in Sasa 1976). Reports from the 1940s showed filariasis to be endemic in most islands of the Gilbert group (Sasa 1976). Infection rates were low in the northern islands but high in the central group. Filariasis was also noted in the southern group, but no data on this were available. By 1974, according to the WHO/SPC seminar on filariasis (WHO/SPC 1974), "on the 17 Gilbert islands, there does not appear to be a significant filariasis problem".

In 1999 Kiribati became a member of PacELF. A baseline blood survey of 2824 people of the Gilbert Islands in 1999–2000 found 1.7% to be antigen-positive; a similar survey of 400 people on Christmas Island in the Line Islands group in 2001 showed an antigen-positive rate of 6.8%. Thus, Kiribati was classified as an endemic country.

An MDA campaign using DEC (6 mg/kg) and albendazole (400 mg) was begun in 2000 under PacELF. The first MDA in 2001 treated 50 580 people (59.8%), the second in 2002 treated 38 802 people (45.9%), and the third in 2003 treated 36 742 people (43.5%). A midterm blood survey in 2003 in the Gilbert Islands found four antigen-positive cases out of 1169 tested (0.3%), but none among the 1051 people tested on Christmas Island (Line Island group). The fourth MDA in 2004 covered 56 741 people (67.2%). In 2004, four out of 876 people in the Gilbert Islands (0.5%) and 12 out of 1472 people on Christmas Island (0.8%) were found to be antigen-positive.

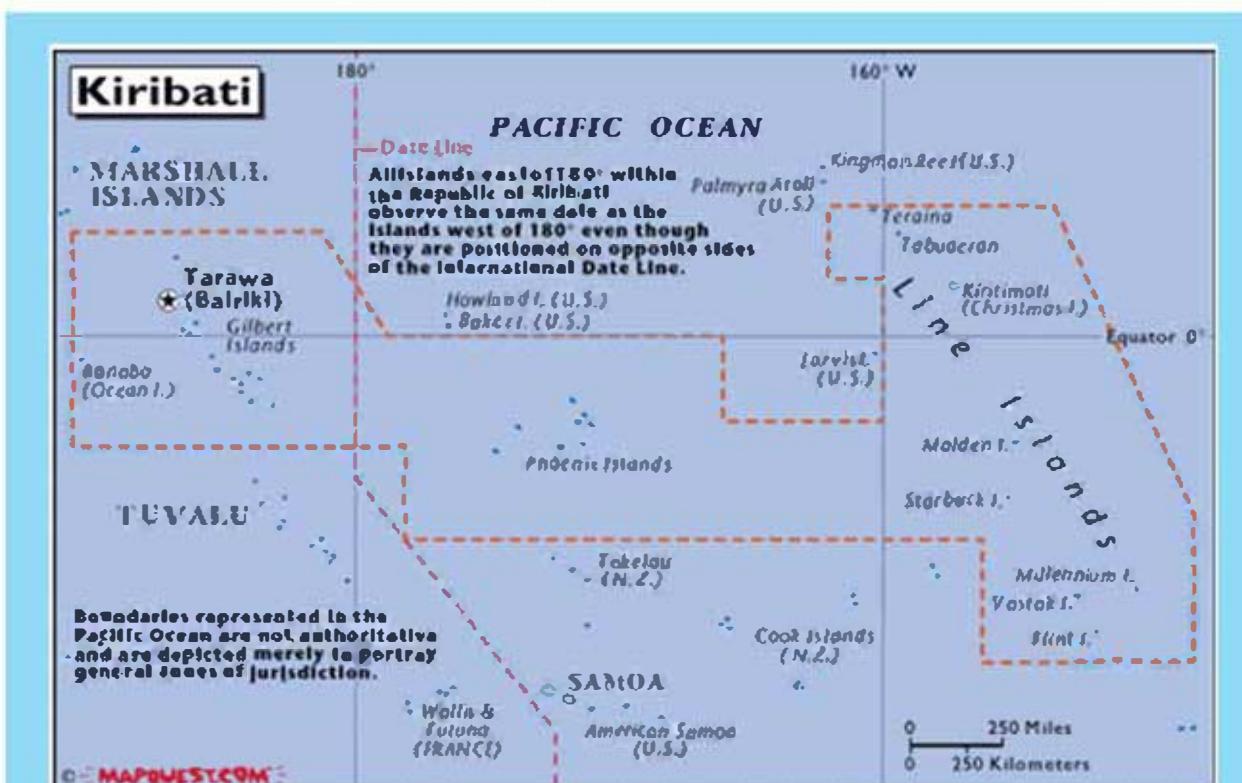


## 2 Country Profile

### Filariasis Type and Vectors

Filariasis latest status	Endemic
Filaria type	<i>Wuchereria bancrofti</i>
Mosquito vectors	<i>Culex quinquefasciatus</i>

Source: Culicidae of the Australasian Region, Volume 12, 1989.



Source: MapQuest.com

### Coat of Arms



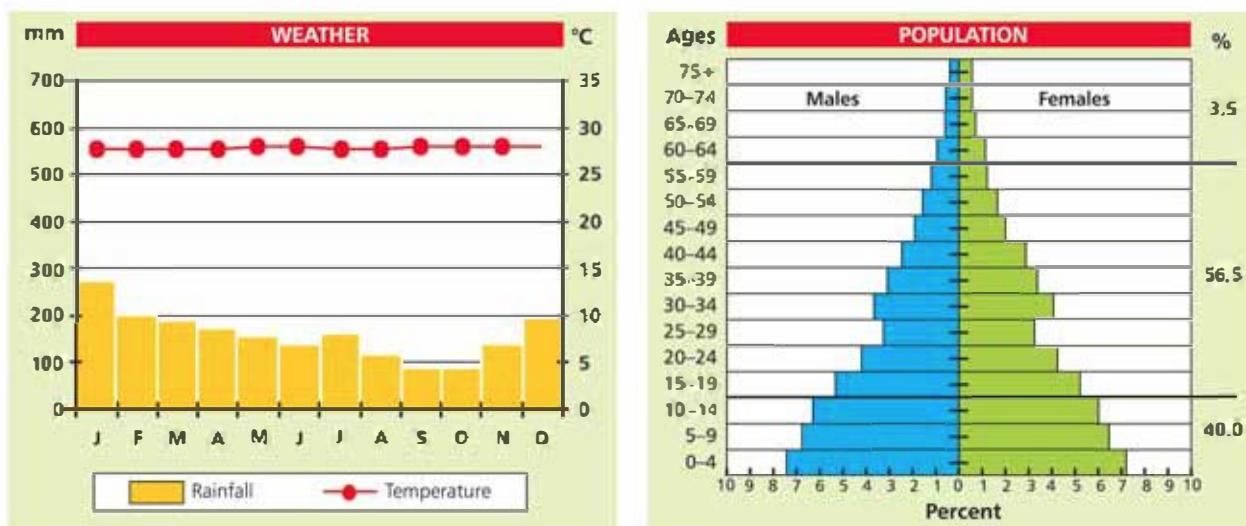
Source: Wikipedia



## General Information

Capital city	Tarawa
Number of islands	33
Land area	811 sq km
Languages	English, I-Kiribati (Gilbertese)
People	Micronesian, some Polynesian
Gross domestic product (GDP) per capita (2000 est.)	\$850
Economy	Fishing, handicrafts
Total population by census (2000)	84 494
Population estimated (2004)	93 100
Population density (people/km <sup>2</sup> )	115
Infant mortality rate (per 1000 live births) (2000)	43
Maternal mortality rate (per 100 000 live births) (2002)	103
Life expectancy at birth	61.5
Leading causes of mortality (2002)	Symptoms, signs and ill-defined conditions, diseases of the circulatory system, diseases of the digestive system, infectious and parasitic system, certain conditions originating perinatal

Source: Country Health Information Profile 2004 (WHO Regional Office for the Western Pacific), the Secretariat of the Pacific Community (SPC), Lonely Planet Destinations



Source: WorldClimate.  
Temperature: Tarawa 1957 and 1990.  
Rainfall: Tarawa 1926 and 1983.

Source: Secretariat of the Pacific Community, 2000

## 3 Filariasis before PacELF

### Country Filariasis Activities in the 1900s before PacELF

#### Microfilaria Prevalence and Clinical Surveys

Population/Area	Date	% Mf pos (n)	Noted Clinical Features % (n)	Primary Reference
There are no epidemiologic records in the 1900s				

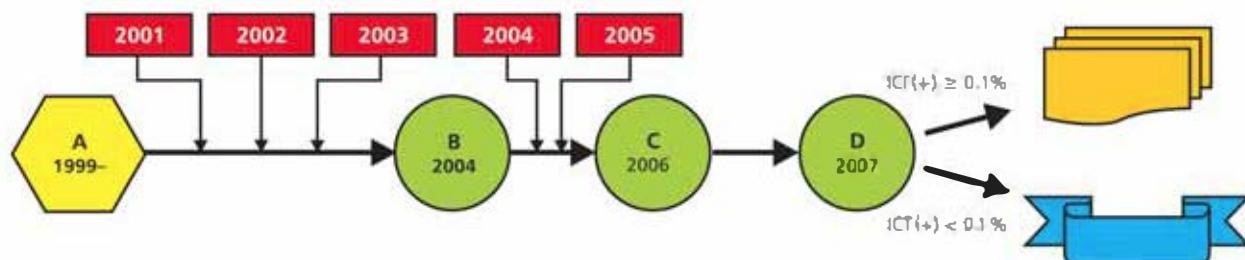
#### Mass Drug Administration or Other Control Measures

Population/Area	Date	Activity	Details	Primary Reference
There are no records of control programs in the 1900s				



## 4 PacELF Activity

### PacELF Country Plan



Type	Year	Sampling	Target	Result
<b>A</b>	1999-2001	Convenience	Sentinel sites Gilbert islands	ICT 1.7% (48/2824)
	2001	Convenience	Sentinel sites Christmas islands	ICT 6.8% (27/400)
<b>B</b>	2003/2004	Cluster	Sentinel sites Christmas islands, Tarawa, Nikunau	
<b>C</b>		Cluster	Stratified survey by island group	
<b>D</b>	2007	Complete	2500 all 5- to 6-year-old children	

Source: PacMAN Book 2004

### Results of Blood Surveys and MDAs under PacELF

#### Blood Surveys

Date	Method	Target	Sampling	No. examined	No. of positives	Positive rate (%)	Remarks	Reference
Nov/99 – Mar/00	ICT	Sentinel Site (Gilbert Is.)	convenience sample	2824	48	1.7		Blood Survey Report
2001	ICT	Sentinel Site (Christmas Is.)	convenience sample	400	27	6.8		Presentation in AM4
Dec-03	ICT	Sentinel Site (Gilbert Is.)	convenience sample	1169	4	0.3		Report of MOH, 18-Nov-04
Dec-03	ICT	Sentinel Site (Christmas Is.)	convenience sample	1051	0	0.0		Report of MOH, 18-Nov-04
Sep-Oct 04	ICT	Sentinel Site (Christmas Is.)	convenience sample	1472	12	0.8		Report of MOH, 18-Nov-04
Nov-04	ICT	Sentinel Site (Gilbert Is.)	convenience sample	876	4	0.5		Report of MOH, 18-Nov-04

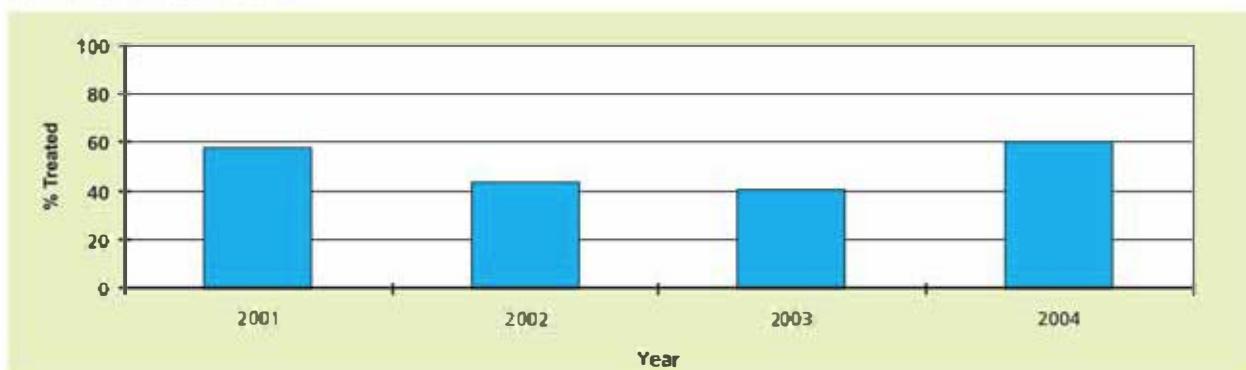


#### MDAs

Year	MDA	Reported population	Estimated population*	Registered population	% Registered	Treated population	% Treated / Reported	% Treated / Estimated*	% Treated / Registered	Reference
2001	1st	84 494	86 646	60 537	71.7	50 560	59.8	58.4	83.5	MDA Report 2001
2002	2nd	84 494	88 797	46 767	55.4	38 802	45.9	43.7	83.0	MDA Report 2002
2003	3rd	84 494	90 949	41 256	48.8	36 742	43.5	40.4	89.1	Report of MOH, 14-Jan-04
2004	4th	84 494	93 100			56 741	67.2	60.9		Annual Report 2004

## The PacELF Way Towards the Elimination of Lymphatic Filariasis in the Pacific

#### **MDA Coverage, 2001-2004**



#### **Supplies Shipped from PacELF, 2000–2004**

Year	2000	2001	2002	2003	2004
ALB (tablets)	-	85 000	99 600	100 000	100 000
DEC (tablets)	-	900 000	800 000	800 000	900 000
ICT (test cards)	-	500	3 000	3 000	3 000

**Partnership:** WHO, GSK (artemether), JICA (DEC, ICT)

## Distribution Dose of DEC and Albendazole Tablets

Age	No. of DEC tablets	No. of albendazole tablets
2-5	1	1
6-10	2	1
11-15	4	1
16-20	6	1
21-50	8	1
51 and up	7	1

### **Registration Form**



## IEC Materials

**Bwai-n-Aorakiana**

- Te Bwai-n-Bwai n aroa: DEC ao Alberandaide
- Tarovean ma kafekelaren raoi te maneka ni te robwata ake a rototad
- Kabonganaakin te antibiotic cream



**Totokoana**

- Pabotokakin te arge relle libdin taikan te aoraó na-kola somata man te on-aorak

**• Mebutakkin talan' bwai-n-nakola somata ni taoa ririki**

**• Kaltutan mwetengam ao taiao ake e na Nona ni kaebung lai te mani-n-ara**

**• Kabonganaakin te bwanga ni lain lo matu**

**• Tutuo kaen jut**

**• Kabongana te oera bwukin te kuatu n tilinga te mban-mana inanon ami tangke n ran.**

**TE TIBU MAN TE MANI-N-ARA**

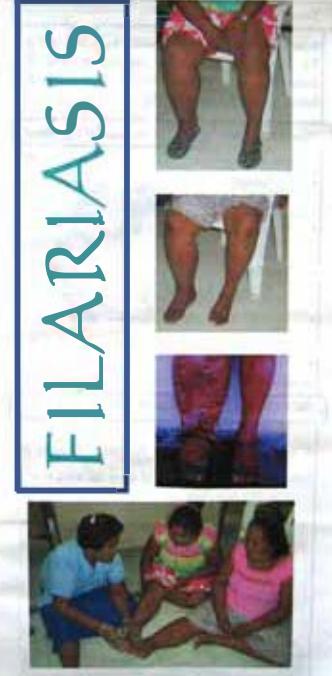


**FILARIASIS**

Designed & Printed at  
Health Education & Health Promotor Services  
Ministry of Health & Medical Services  
KIRIBATI—2004

Pamphlet

**FILARIASIS**



**• KALTAKKA MELON TE  
MBOHO AT TE JUJUBA &  
BANJO BAGI AN GURANGA  
DE KIRIBATI TE MAMARABA NI  
AMANI HI KIRIBATI**



**Pamphlet**

**T-shirt**



**Operational Staff:** MOH medical service, Ministry of Education, Island council





# Marshall Islands



## 1 Summary

The Marshall Islands is a group of five islands and 29 atolls situated between 5°–15°N and 162°–173°E. It has a land area of 181 sq km and a population of 50 840 (1999). The estimated population in 2004 was 55 400 (SPC 2004). The capital is Majuro. The Marshall Islands was formerly part of the US-administered UN Trust Territory of the Pacific Islands.

Filariasis prevalence was 1% on Majuro in 1944, and 3.6% on Namorik in 1953 (Pipkin 1953). The other islands were apparently non-endemic for filariasis.

In 1999, Marshall Islands joined PacELF. A nationwide antigen prevalence survey of 2004 people in 2001 found two positive cases (0.1%) on Mejit Island. The Marshall Islands was therefore classified as a partially endemic country.

In 2002, a blood antigen survey (Ministry of Health; country presentation at Fifth PacELF Annual Meeting in 2003) on two islands found 130 antigen-positive cases among 294 people examined on Mejit (44.2%), and 71 antigen-positive cases among 244 people examined on Ailuk (29%). A similar survey in 2003 found no positive cases among the 217 people examined on Wotje and the 318 people examined on Ebon.

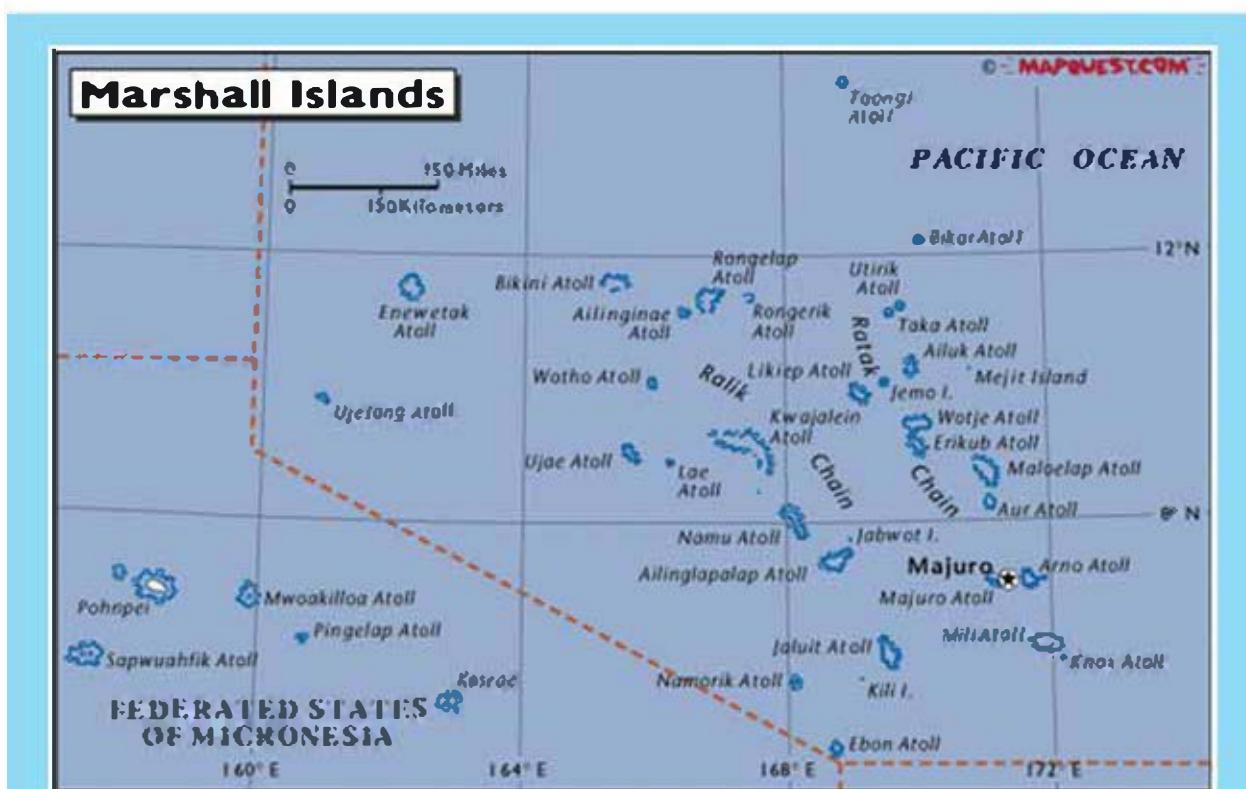
The first round of MDA with DEC (6 mg/kg) and albendazole (400 mg) was done on Mejit and Ailuk in 2002 (Ministry of Health; country presentation at fifth PacELF annual meeting in 2003). The coverage achieved was 81.0% on Mejit (337 people treated) and 67.6% on Ailuk (346 people treated). The second MDA in 2003 treated 286 people (68.8%) on Mejit and 346 people (67.6%) on Ailuk.

## 2 Country Profile

### Filariasis Type and Vectors

<b>Filariasis latest status</b>	Partially endemic
<b>Filaria type</b>	<i>Wuchereria bancrofti</i> Diurnally sub-periodic
<b>Mosquito vectors</b>	<i>Culex quinquefasciatus</i>

Source: Culicidae of the Australasian Region, Volume 12, 1989



Source: MapQuest.com

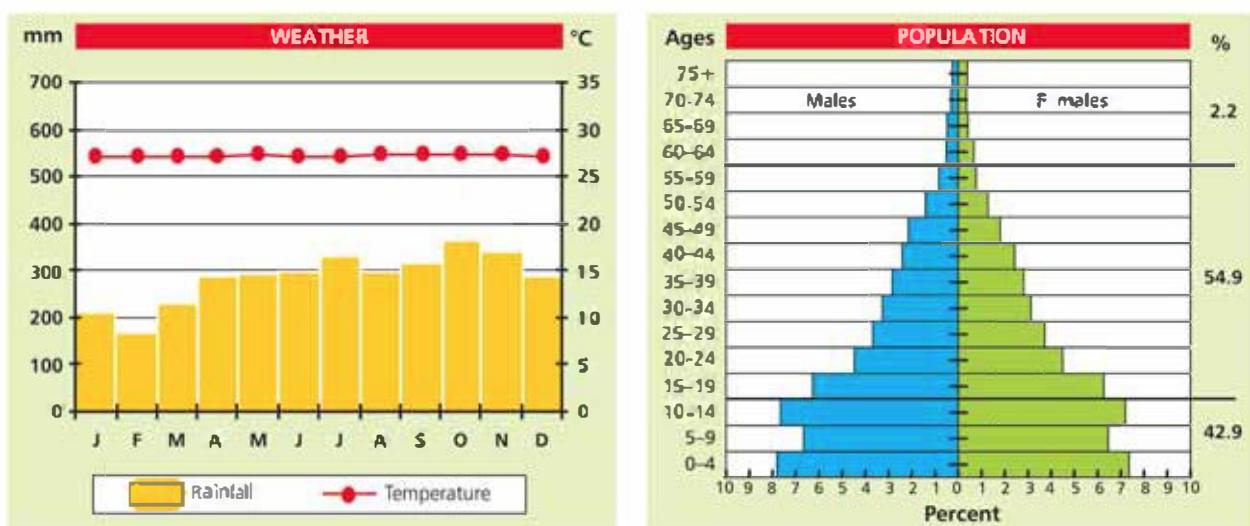


Source: Wikipedia



Capital city	Majuro
Number of islands	5 Islands and 29 atolls
Land area	181 sq km
Languages	Marshallese, English, Japanese
People	Micronesian
Gross domestic product (GDP) per capita	US\$1830
Economy	Copra, fishing, tourism, craft items, offshore banking (embryonic)
Total population by census (1999)	50 840
Population estimated (2004)	55 400
Population density (people/km <sup>2</sup> )	306
Infant mortality rate (per 1000 live births) (1999)	37
Maternal mortality rate (per 100 000 live births)	Not available
Life expectancy at birth (1999)	67.5
Leading causes of mortality (2002)	Malnutrition, diseases of the circulatory system, accidents (all types), neoplasms, sepsis, injury, poisoning and certain other consequences of external causes, pneumonia, diseases of the digestive system, cancer (all types), diseases of the respiratory system

Source: Country Health Information Profile 2004 (WHO Regional Office for the Western Pacific), the Secretariat of the Pacific Community (SPC), Lonely Planet Destinations



Source: WorldClimate,  
Temperature: Majuro 1951 and 1998,  
Rainfall: Majuro 1951 to 1995

Source: Secretariat of the Pacific Community, 2000

### 3 Filariasis before PacELF

#### Country Filariasis Activities in the 1900s before PacELF

##### Microfilaria Prevalence and Clinical Surveys

Population/Area	Date	% MF pos (n)	Noted Clinical Features % (n)	Primary Reference
There are no epidemiologic records in the 1900s				

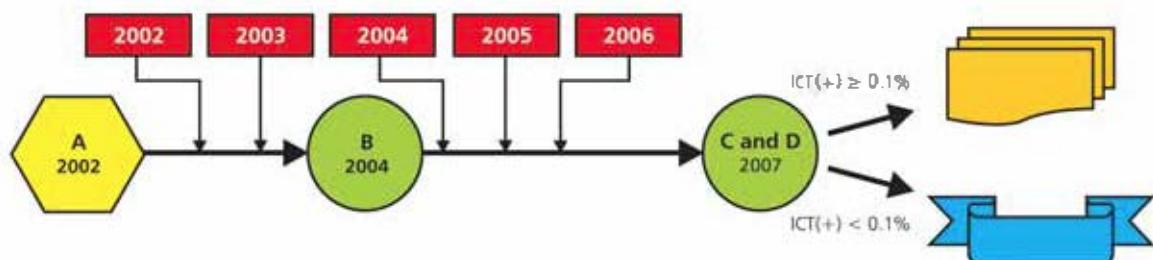
##### Mass Drug Administration or Other Control Measures

Population/Area	Date	Activity	Details	Primary Reference
There are no records of control programs in the 1900s				

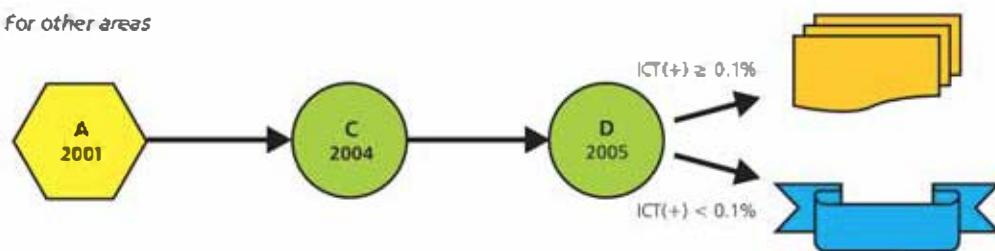
## 4 PacELF Activity

### PacELF Country Plan

For Mejit Island



For other areas



Type	Year	Sampling	Target	Result
A	2001	Convenience	Countrywide	ICT 0.1% (2/2004)
	2002		Mejit island	ICT 44.2% (130/294)
B	2004	Cluster	Sentinel sites Mejit island	
C	2007	Cluster	Stratified survey Mejit island	
D	2007	LQAS	1500 all 5- to 6-year-old children	
	2007	Whole population	Mjejit	

Source: PacMAN Book 2004

### Results of Blood Surveys and MDAs under PacELF

#### Blood Surveys

Date	Method	Target	Sampling	No. examined	No. of positives	Positive rate (%)	Remarks	Reference
2001	ICT	Whole area	convenience sample	2004	2	0.1	2 positives from Mejit Is.	MOH Report 2001
May-02	ICT	Mjejit Island	convenience sample	294	130	44.2		Presentation in AMS
Jun-02	ICT	Ailuk Island	convenience sample	244	71	29.1		Presentation in AMS
2003	ICT	Wotje Island	convenience sample	217	0	0.0		Presentation in AMS
2003	ICT	Ebon Island	convenience sample	318	0	0.0		Presentation in AMS

#### Targeted MDAs for Mjejit and Ailuk Island

Year	MDA	Reported population	Estimated population*	Registered population	% Registered	Treated population	% Treated / Reported	% Treated / Estimated*	% Treated / Registered	Reference
2002	Targeted MDA	Mjejit, 416	416	294	70.7	337	81.0	81.0	114.6	Presentation in AMS
2002	Targeted MDA	Ailuk, 512	512	346	67.6	346	67.6	67.6	100.0	Presentation in AMS
2003	Targeted MDA	Mjejit, 416	416	318	76.4	286	68.8	68.8	89.9	Presentation in AMS
2003	Targeted MDA	Ailuk, 512	512	410	80.1	346	67.6	67.6	84.4	Presentation in AMS

\*Estimated assuming constant growth rate between latest census and 2004 population estimate (SPC)



**Supplies Shipped from PacELF, 2000–2004**

Year	2000	2001	2002	2003	2004
ALB (tablets)	-	-	1000	1000	1000
DEC (tablets)	-	-	10 000	10 000	10 000
ICT (test cards)	-	2500	1000	1000	3000

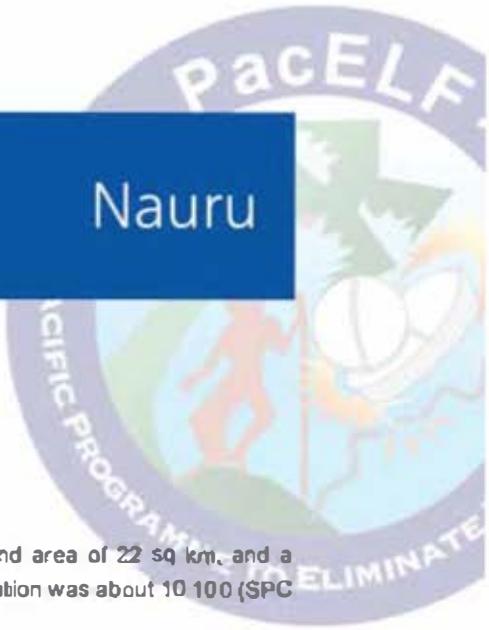
Partnership: WHO, JICA (DEC, ICT)

**Operational Staff:** Public health staff





Nauru



## 1 Summary

Nauru is an island situated at 0.3°S and 167°E. It has a land area of 22 sq km, and a population of 9919 in 1992 and 10 065 in 2002. In 2004 the population was about 10 100 (SPC 2004).

In a 1926 survey of the entire population (excluding infants), the prevalence of MI was found to be 28.8% (332 positives out of 1151 examined) (Bray 1931). Elephantiasis was rare, but fever attacks, lymphangitis, and adenitis were very common, and 10% of the male population had hydrocoele with minor swelling. In 1933 the MI prevalence was reported to be 36.1% nationwide, with 21 cases of elephantiasis and no cases of hydrocoele in a total population of 1500 (Grant 1933).

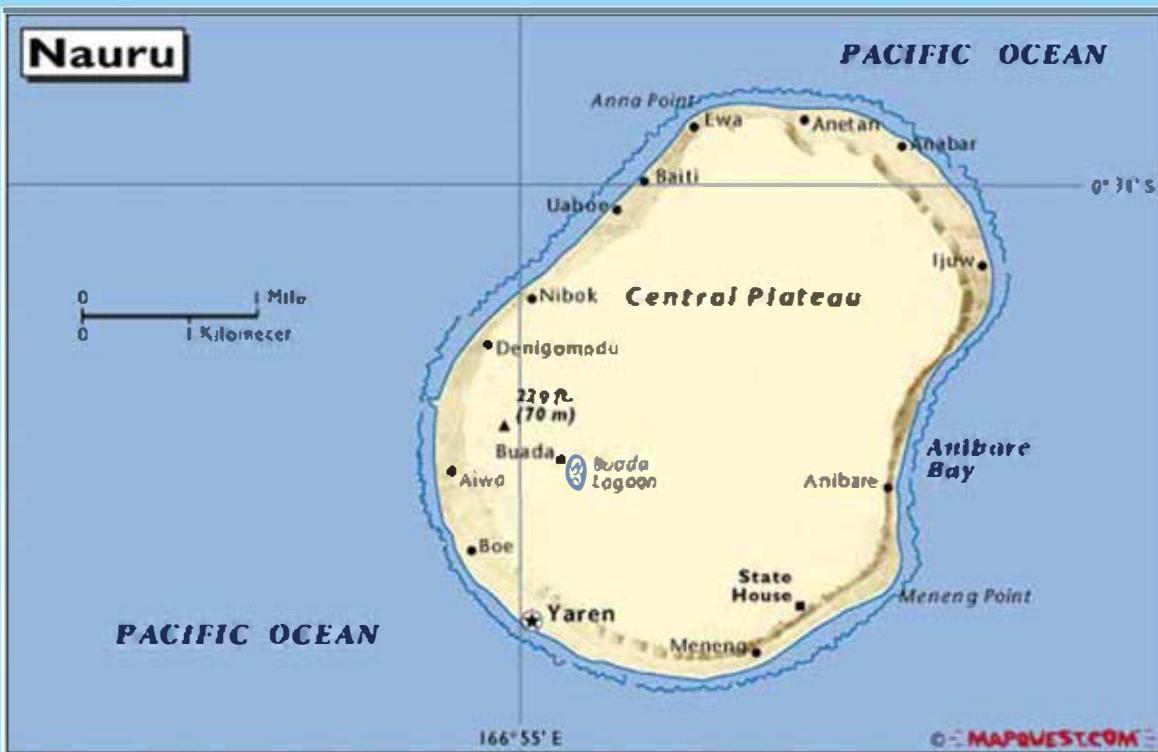
In 1999, Nauru joined PacELF. A nationwide blood antigen survey that year (Ministry of Health, reported in 2000) found only one positive in the 388 people examined (0.26%). As this positive case was not a resident, Nauru was classified as a non-endemic country. There is no record of further filariasis control activities in Nauru after this survey.



## 2 Country Profile

### Filariasis Type and Vectors

<b>Filariasis latest status</b>	Non-endemic
<b>Filaria type</b>	<i>Wuchereria bancrofti</i> Nocturnally periodic
<b>Mosquito vectors</b>	<i>Culex quinquefasciatus</i>
	Source: Culicidae of the Australasian Region, Volume 12, 1989



Source: MapQuest.com

Coat of Arms



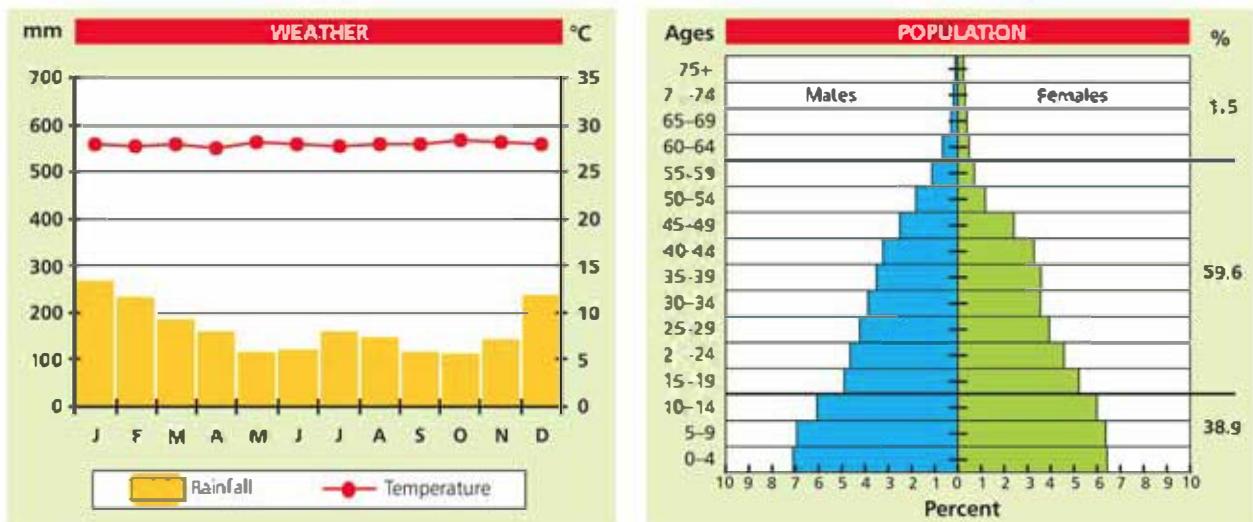
Source: Wikipedia



## The PacELF Way Towards the Elimination of Lymphatic Filariasis in the Pacific

Capital city	Yaren
Number of islands	1
Land area	21 sq km
Languages	English, Nauru
People	Melanesian, Polynesian, Pacific Islanders, Asians, Europeans
Gross domestic product (GDP) per capita	\$5000 (2000 est.)
Economy	Phosphate mining
Total population by census (2002)	10 065
Population estimated (2004)	10 100
Population density (people/km <sup>2</sup> )	481
Infant mortality rate (per 1000 live births) (2002)	12.7
Maternal mortality rate (per 100 000 live births) (2002)	300
Life expectancy at birth	62.3
Leading causes of mortality (2002)	Diabetes, diseases of respiratory system, disease of the circulatory system (exclude hypertension), neoplasm, transport accident and drowning

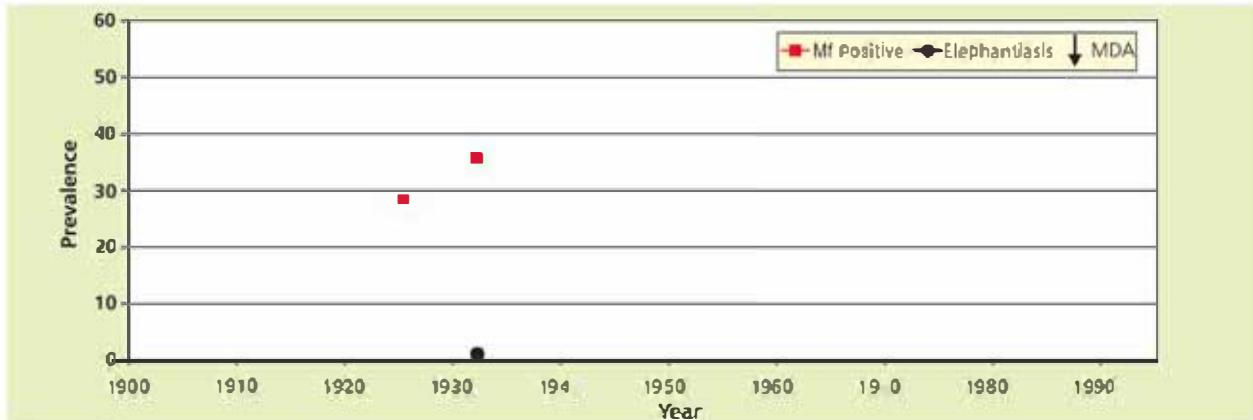
Source: Country Health Information Profile 2004 (WHO Regional Office for the Western Pacific), the Secretariat of the Pacific Community (SPC), Lonely Planet Destinations



Source: WorldClimate.  
Temperature: Nauru 1961 and 1970,  
Rainfall: Nauru 1892 to 1977.

Source: Secretariat of the Pacific Community, 2000

## 3 Filariasis before PacELF, 1900–1990



## Country Filariasis Activities in the 1900s before PacELF

### Microfilaria Prevalence and Clinical Surveys

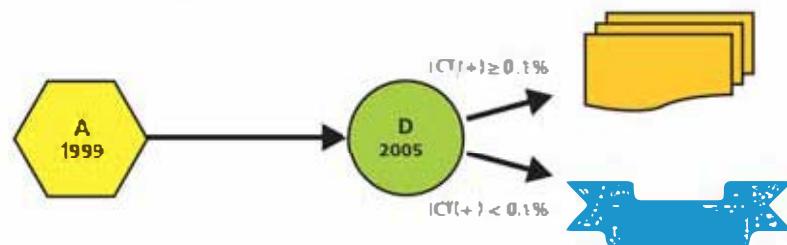
Population/Area	Date	% Mf pos (n)	Noted Clinical Features % (n)	Primary Reference
Nauru; no infants	1926	28.8 (1151)	Small hydrocoele: 10 (1151)	Bray GW (1931)
Nationwide	1933	36.1 (354)	Elephantiasis: 1.4 (1500) Hydrocoele: 0 (1151)	Grant AB (1933)

### Mass Drug Administration or Other Control Measures

Population/Area	Date	Activity	Details	Primary Reference
There are no records of control programs in the 1900s				

## 4 PacELF Activity

### PacELF Country Plan



Type	Year	Sampling	Target	Result
A	1999	Convenience	Nationwide	ICT: 0.3% (1/388)
D	2005	Complete	340 all 5- to 6-year-old children	

Source: PacMAN Book 2004

### Results of Blood Surveys and MDAs under PacELF

#### Blood Surveys

Date	Method	Target	Sampling	No. examined	No. of positives	Positive rate (%)	Remarks	Reference
Nov-99	ICT	Whole area	convenient sample	388	1	0.3		Ministry of Health Report 2001

#### Supplies Shipped from PacELF, 2000–2004

Year	2000	2001	2002	2003	2004
ALB (tablets)	-	-	-	-	-
DEC (tablets)	-	-	-	-	-
ICT (test cards)	-	500	-	1000	1000

Partnership: WHO, JICA (DEC, ICT)

**Operational Staff:** Medical officer, Public health nurse





# New Caledonia

## 1 Summary

The French Overseas Territory of New Caledonia consists of 12 islands, between 19°S to 23°S and 163°E to 168°E. Its land area is 19 103 sq km with a population of 196 836 at the 1996 census. In 2004 the population was estimated to be 236 900 (SPC, 2004). The capital is Nouméa on the island of Grande Terre. New Caledonia includes the Loyalty Islands group.

Cases of elephantiasis and other filarial disease symptoms were common, judging by early medical records during the 18th and 19th centuries. According to Iyengar (1965), the main foci of filarial infection in New Caledonia were: (1) Balade, Pouembout, Touho, Mou and Ouasse in the East coast; and (2) Koumac, Gomen, Voh, and Nepou on the West Coast. In the Loyalty Islands, cases of filarial infection were recorded from Lifou and Ouvéa. However, only a small number of elephantiasis cases were observed. A survey of 382 adults on Ouvéa Island in 1997 found an Mf rate of 3.1% and a filarial antibody-positive rate of 32.5% without any clinical cases being found (country data, unpublished).

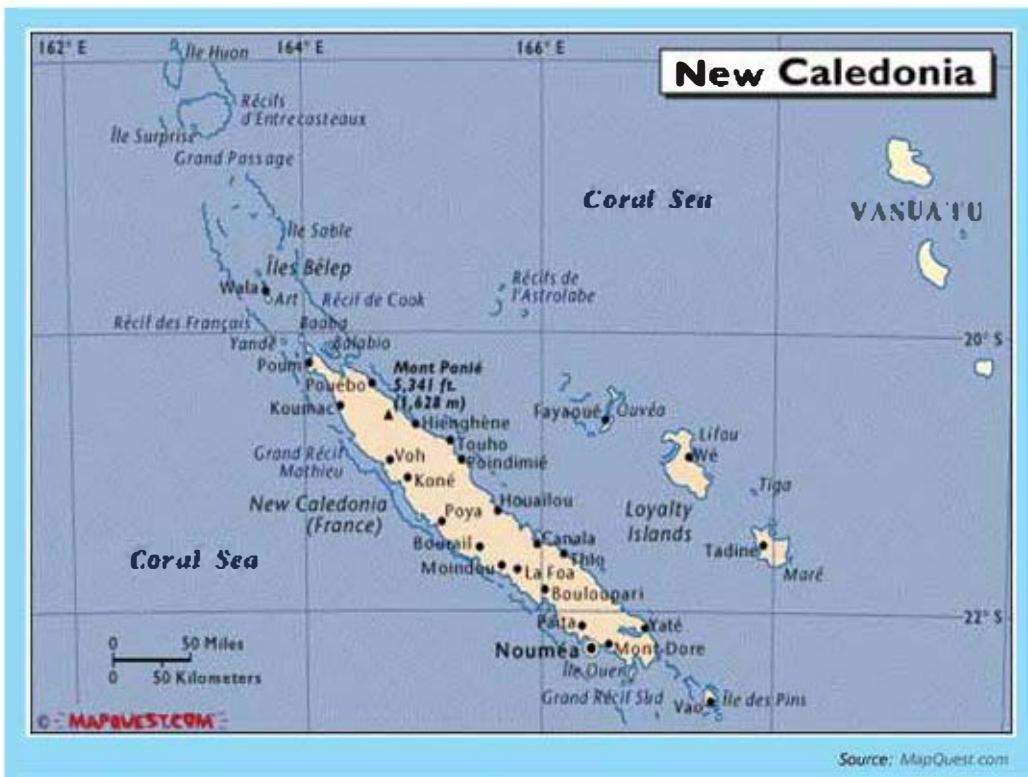
In 1999 New Caledonia joined PacELF and a blood survey was carried out in school children in Ouvéa in 2001: 2 antigen positive cases in 136 children were found (1.5%) (country presentation at Fourth PacELF Annual Meeting in 2002). In 2003–2004, a larger baseline survey carried out in 13 districts found 7 antigen positives out of 1384 people tested (0.5%) (country presentation at Sixth PacELF Annual Meeting in 2004).

## 2 Country Profile

### **Filariasis Type and Vectors**

<b>Filarisis latest status</b>	Partially endemic
<b>Filaria type</b>	<i>Wuchereria bancrofti</i>
<b>Mosquito vectors</b>	<i>Aedes vigilax</i>

Source: Culicidae of the Australasian Region, Volume 12, 1989

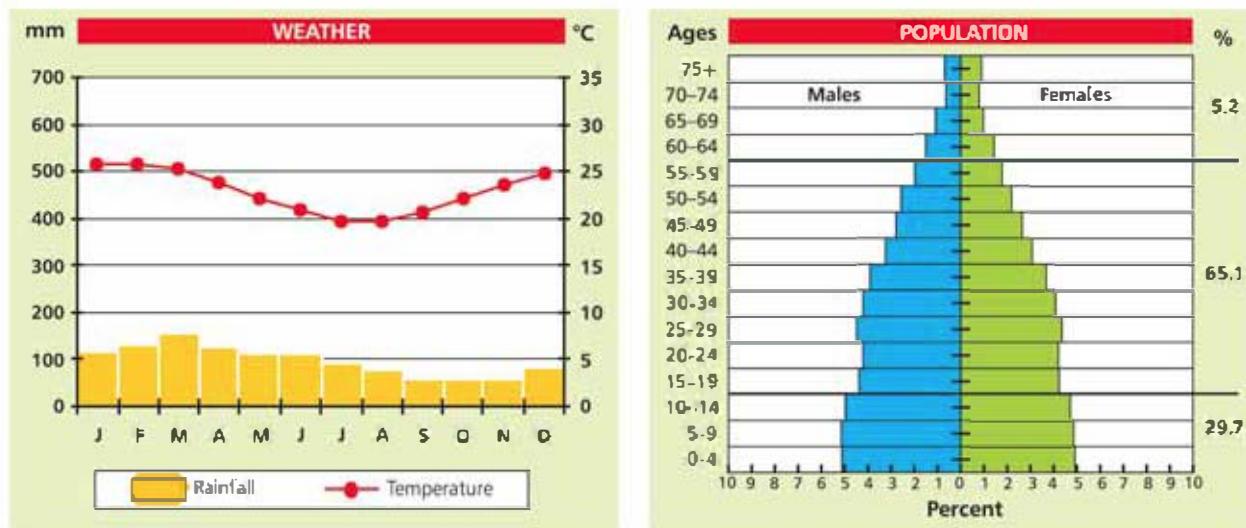


## **General Information**

Capital city	Noumea
Number of islands	12
Land area	18,576 sq km
Language	French, 33 Melanesian and Polynesian dialects
People	Melanesian (44.1%), European (31.4%), Pacific Islanders and Indonesians
Gross domestic product (GDP) per capita (1997)	\$16 679
Economy	Nickel mining, agriculture, tourism
Total population by census (1996)	196 836
Population estimated (2004)	236 900
Population density (people/km <sup>2</sup> )	13
Infant mortality rate (per 1000 live births) (2001)	4.9
Maternal mortality rate (per 100 000 live births)	33.30 (1991–2001)
Life expectancy at birth (2001)	73.1
Leading causes of mortality (2002)	Diseases of the circulatory system, malignant neoplasms, external causes of morbidity and mortality, diseases of the respiratory system, symptoms, signs and abnormal clinical and laboratory findings, not elsewhere classified

Source: Country Health Information Profile 2002 (WHO) Regional Office for the Western Pacific, the Secretariat of the Pacific Community (SPC), Lonely Planet Destinations

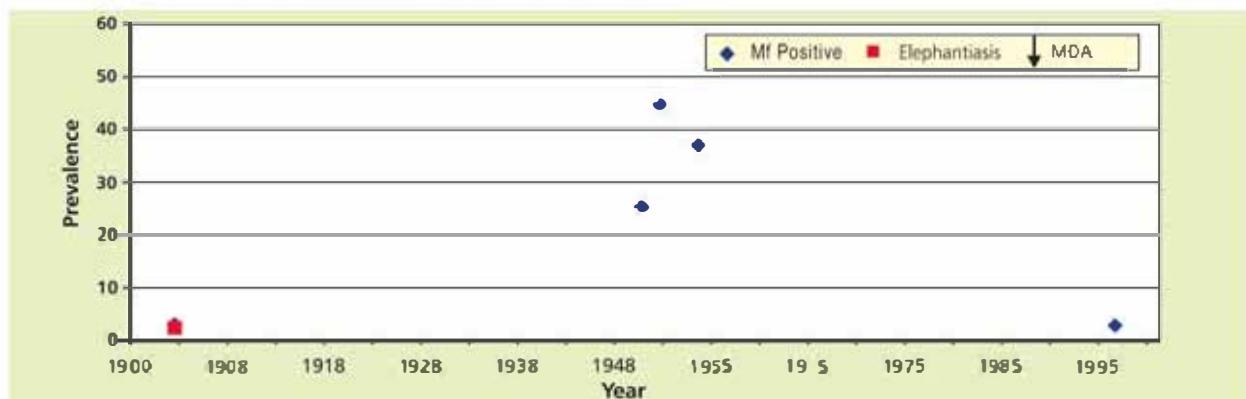




Source: WorldClimate,  
Temperature: Noumea 1891 and 1990,  
Rainfall: Noumea 1874 and 1990

Source: Secretariat of the Pacific Community, 2000

### 3 Filariasis before PacELF, 1900–1995



#### Country Filariasis Activities in the 1900s before PacELF

##### Microfilaria Prevalence and Clinical Surveys

Population/Area	Date	% Mf pos (n)	Noted Clinical Features % (n)	Primary Reference
Age > 20; New Caledonia	1903	3.4 (117)	Elephantiasis: 2.7 (117)	Lang, Noc (1903)
New Caledonia	1950	5.8 (52)		Perry WJ (1950)
Ponerihouen, Mou village; adults	1950	49.1 (57)		Merlet Y (1950)
Ponerihouen, Mou village	1954	37.2 (86)		Iyengar MT (1954)
Gatope	1950	22.2 (45)		Merlet Y (1950)
Oundjo	1950	24.8 (129)		Merlet Y (1950)
Pouebo	1951	59.3 (81)		Kerrest JM (1952)
Koumac	1951	16.6 (24)		Kerrest JM (1952)
Gomen	1951	7.7 (13)		Kerrest JM (1952)
Ouvea	1995–1997	3.1 (382)		Country Report

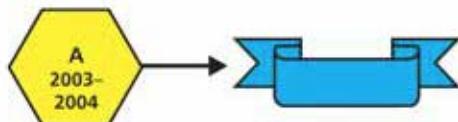
##### Mass Drug Administration or Other Control Measures

Population/Area	Date	Activity	Details	Primary Reference
There are no records of any control programme in New Caledonia in the 1900s				



## 4 PacELF Activity

### PacELF Country Plan



Type	Year	Sampling	Target	Result
A	1999	Cluster	School children 9–11 year old in Ouvéa island	ICT: 1.5% (2/136)
	2004	Cluster	Health facilities in 13 districts	ICT: 0.5% (7/1384)
C and D		LQAS	all 5- and 6-year-old children	

Source: PacMAN Book 2004

### Results of Blood Surveys and MDAs under PacELF

#### Blood Surveys

Date	Method	Target	Sampling	No. examined	No. of positives	Positive rate (%)	Remarks	Reference
2001	ICT	School children in Ouvéa	convenience sample	136	2	1.5		Presentation in AM4
Oct 03–Mar04	ICT	Health facilities in 13 districts	convenience sample	1384	7	0.5	ME	Presentation in AM6

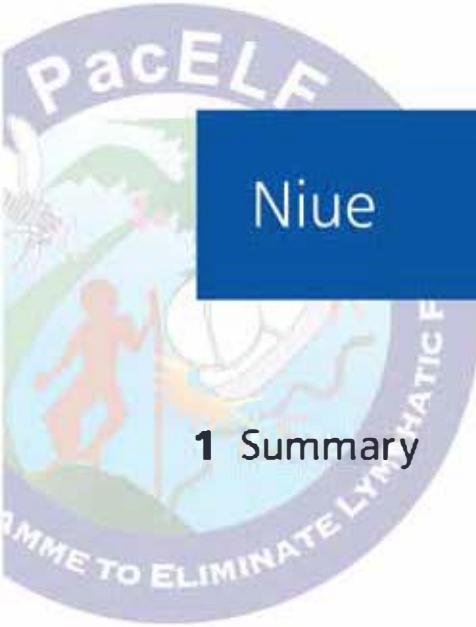
#### Supplies Shipped from PacELF, 2000–2004

Year	2000	2001	2002	2003	2004
ALB (tablets)	-	-	-	-	-
DEC (tablets)	-	-	-	-	-
ICT (test cards)	-	-	-	-	-

Partnership: WHO

**Operational Staff:** Preventive Department, Direction des Affaires Sanitaires et Sociales





# Niue



## 1 Summary

Niue, a self-governing island in free association with New Zealand, is located at 19°S and 169°W. It has a land area of 259 sq km and a population of 1788 (2001). The resident population in 2002 was estimated to be 1600 (SPC 2004). The capital is Alofi.

Filariasis prevalence was 22.1% in 1954 (Simpson 1957). An MDA with DEC in January 1956 reduced the rate to 2.9% in December of that year (Iyengar 1958) and to 3.2% in 1960 (PacELF data, unpublished). However, a survey of 99.7% of the population in 1971 showed that the MI rate had increased to 16.3%. Another MDA using DEC in 1972 was thought to have eliminated the disease (WHO/SPC 1974), but a survey in 1996 found an MI rate of 1.8% (country data, unpublished). In 1997, another MDA using a combination of ivermectin (200 mcg/kg) and DEC (6 mg/kg) was implemented.

Niue joined PacELF in 1999. Despite an MDA in 1997, 64.3% of cases were still antigen-positive two years later. A 1999 survey of the whole population found 3.1% of the people to be antigen-positive (country report 1999).

In 2000, an MDA using DEC (6 mg/kg) and albendazole (400 mg) was administered under PacELF. This first MDA covered 1802 people (94.2%) (first annual report). The second MDA in 2001 covered 1706 people (99.1%) (second annual report). After the second MDA, a blood survey of the entire population found 22 positives out of 1630 people examined (1.3%) (country presentation at Third PacELF Annual Meeting in 2001). The third MDA in 2002 covered 1469 people (82.2%) (third annual report). The fourth MDA in 2003 covered 1386 people (77.5%) (correspondence, Niue). Follow-up surveys of positive cases in 2002 and 2003 found 12 of 20 still positive in 2002, and 16 of 26 still positive in 2003. The fifth MDA in 2004 treated 1397 people (85.2% of the population) and a final evaluation survey of 1285 people found only three antigen-positives (0.23%).

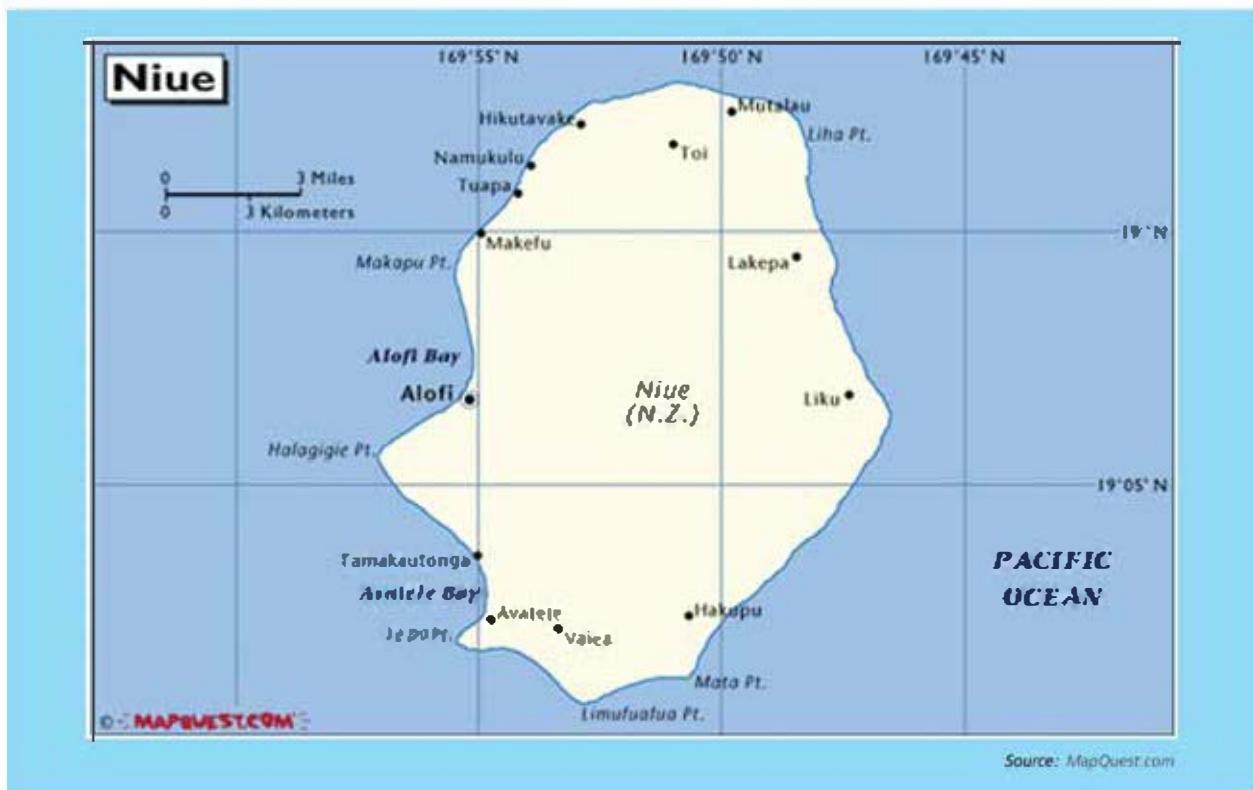


## 2 Country Profile

### Filariasis Type and Vectors

Filariasis latest status	Endemic
Filaria type	<i>Wuchereria bancrofti</i>
Mosquito vectors	<i>Aedes cooki</i>

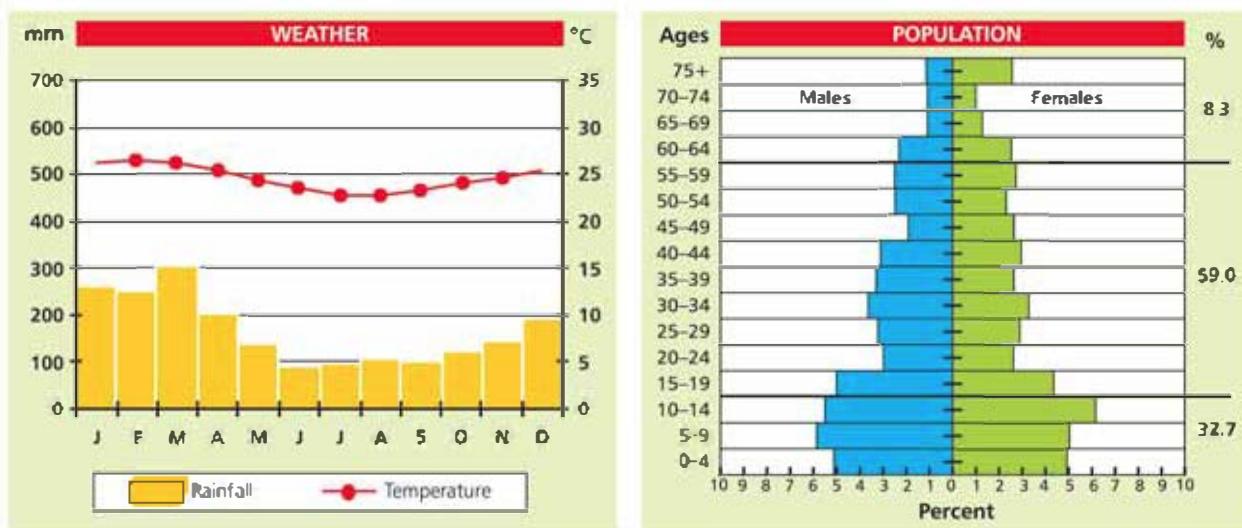
Source: Culicidae of the Australasian Region, Volume 12, 1989



### General Information

Capital city	Alofi
Number of islands	1
Land area	259 sq km
Languages	English, Niuean
People	Polynesian (85%) Niuean, plus Tongan, Tuvaluan, Samoan, New Zealanders
Gross domestic product (GDP) per capita (2000)	\$417
Economy	Philately, agriculture products, handicrafts, fruit processing
Total population by census (2001)	1788
Population estimated (2004)	1600
Population density (people/km <sup>2</sup> )	6
Infant mortality rate (per 1000 live births) (2001)	29.4
Maternal mortality rate (per 100 000 live births) (2002)	Not available
Life expectancy at birth (2001)	70.1
Leading causes of mortality (2002)	Injuries from gunshot, diabetes and hypertension complications, premature births, pneumonia, accidental drowning

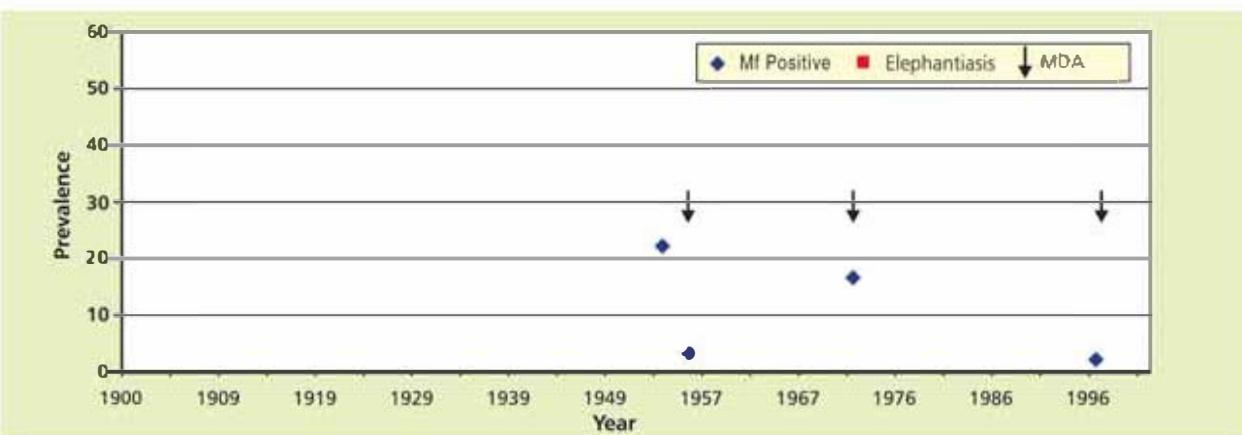
Source: Country Health Information Profile 2004 (WHO Regional Office for the Western Pacific), the Secretariat of the Pacific Community (SPC), Lonely Planet Destinations



Source: WorldClimate  
Temperature: Alotu 1921 to 1990.  
Rainfall: Alotu 1905 to 1990

Source: Secretariat of the Pacific Community, 2000

### 3 Filariasis before PacELF, 1900–1996



#### Country Filariasis Activities in the 1900s before PacELF

##### Microfilaria Prevalence and Clinical Surveys

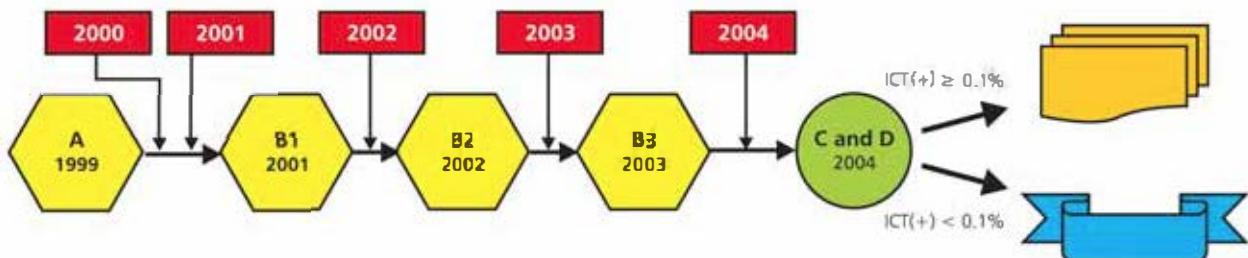
Population/Area	Date	% Mf pos (n)	Noted Clinical Features % (n)	Primary Reference
	1954	22.1 (748)		Simpson ES (1957)
Age > 2	1956	2.9 (2791)		Simpson ES (1957)
99.7% of total population	1972	16.4 (4408)		WHO/SPC (1974)
82% of total population	1996	1.8 (1471)		Country Report (1996–97)

##### Mass Drug Administration or Other Control Measures

Population/Area	Date	Activity	Details	Primary Reference
	1956	MDA	DEC at monthly doses	Simpson ES (1957)
	1972	MDA	DEC 6mg/kg, once a week for 12 weeks, followed by once a month for 12 months	WHO/SPC (1974)
	1997	MDA	Ivermectin (200mcg/kg) and DEC (6mg/kg)	Country Report (1996–97)

## 4 PacELF Activity

### PacELF Country Plan



Type	Year	Sampling	Target	Result
A	1999	Whole population	All inhabitants	ICT 3.1% (56/1794)
B	2001	Whole population	All inhabitants	ICT 1.3% (22/1630)
C and D	2004	Whole population	All inhabitants	ICT 0.2% (3/1285)

Source: PacMAN Book 2004

### Results of Blood Surveys and MDAs under PacELF

#### Blood Surveys

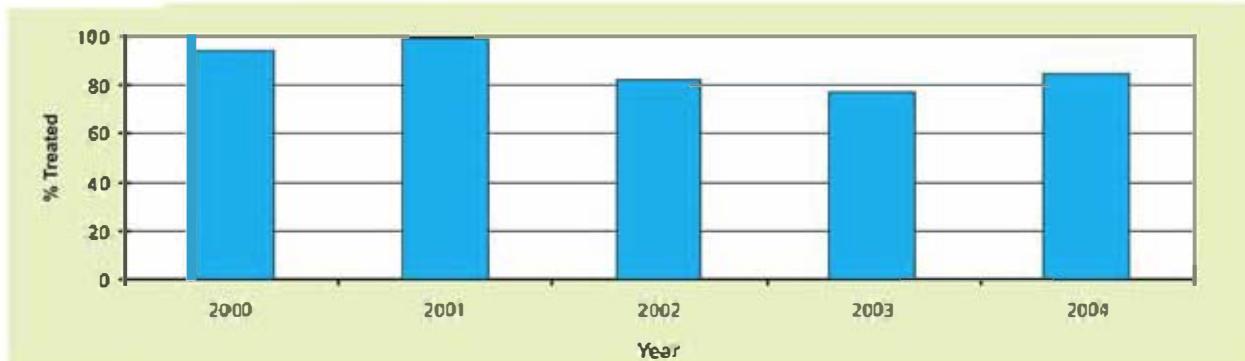
Date	Method	Target	Sampling	No. examined	No. of positives	Positive rate (%)	Remarks	Reference
1999	ICT	Whole area	All inhabitants	1794	56	3.1		MOH Report (Dec/99)
2001	ICT	Whole area	All inhabitants	1630	22	1.3	ME	Presentation in AM3
2002	ICT	Positive cases	follow up	20	12	60.0		MOH Report (27/07/02)
2003	ICT	Positive cases	follow up	26	16	61.5		Presentation in AM5
2004	ICT	Whole area	All inhabitants	1285	3	0.2		Presentation in AM6

#### MDAs

Year	MDA	Reported population	Estimated population*	Registered population	% Registered	Treated population	% Treated / Reported	% Treated / Estimated*	% Treated / Registered	Reference
2000	1st	1913	1851			1802	94.2	97.4		Annual Report 2000
2001	2nd	1722	1788			1706	99.1	95.4		Annual Report 2001
2002	3rd	1788	1725			1469	82.2	85.16		Annual Report 2002
2003	4th	1788	1663			1386	77.5	83.34		Presentation in AM6
2004	5th	1639	1600			1397	85.2	87.3		Presentation in AM6

\*Estimated assuming constant growth rate between latest census and 2004 population estimate (SPC)

#### MDA Coverage, 2000–2004



**Supplies Shipped from PacELF, 2000-2004**

Year	2000	2001	2002	2003	2004
ALB (tablets)	2500	2000	900	2000	-
DEC (tablets)	25 000	20 000	20 000	20 000	20 000
ICT (test cards)	-	2000	1000	1000	2000

**Partnership:** WHO, UNICEF (albendazole), JICA (DEC, ICT)

**Distribution Dose of DEC and Albendazole Tablets**

Age	No. of DEC (50 mg) tablets	No. of albendazole (400 mg) tablets
2 yrs	1	1
3-5 yrs	2	1
6-10 yrs	3	1
11-15 yrs	5	1
16-20 yrs	7	1
21-50 yrs	9	1
51+	8	1

**Operational Staff:** Laboratory technologist, public health nurse





## 1 Summary

The Northern Mariana Islands is a commonwealth of the USA and comprises 15 islands. This archipelago is situated between 13°–20°N and 144°–146°E. It has a land area of 471 sq km and a population of 69 221 (2000). The population in 2004 was estimated to be 78 000 (SPC 2004). The capital is Susupe on the island of Saipan. The Northern Mariana Islands was formerly part of the US-administered UN Trust Territory of the Pacific Islands.

In 1944, the Mf prevalence was 13.5% among 243 people tested on Saipan (Knott 1944, quoted in Sasa 1976); all other areas tested were negative. Only one out of 7000 surveyed had elephantiasis.

The Northern Mariana Islands became a PacELF member in 1999. A blood antigen survey of 1037 people nationwide in 2001 found no evidence of filariasis infection (Department of Public Health 2001). The Northern Mariana Islands was therefore declared non-endemic. No further filariasis activities have been undertaken since this survey.

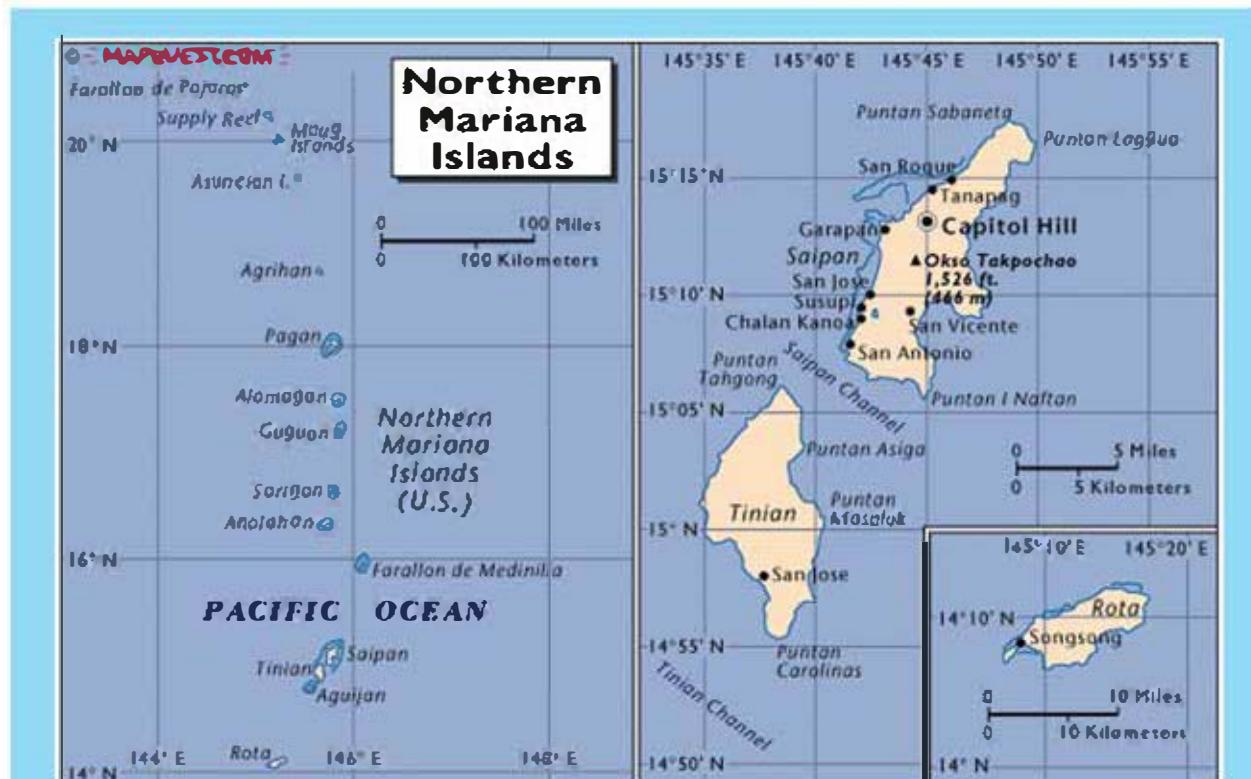


## 2 Country Profile

### Filariasis Type and Vectors

<b>Filariasis latest status</b>	Non-endemic
<b>Filaria type</b>	<i>Wuchereria bancrofti</i>
<b>Mosquito vectors</b>	<i>Nocturnally periodic</i>

Source: Culicidae of the Australasian Region, Volume 12, 1989



Source: MapQuest.com

### Coat of Arms

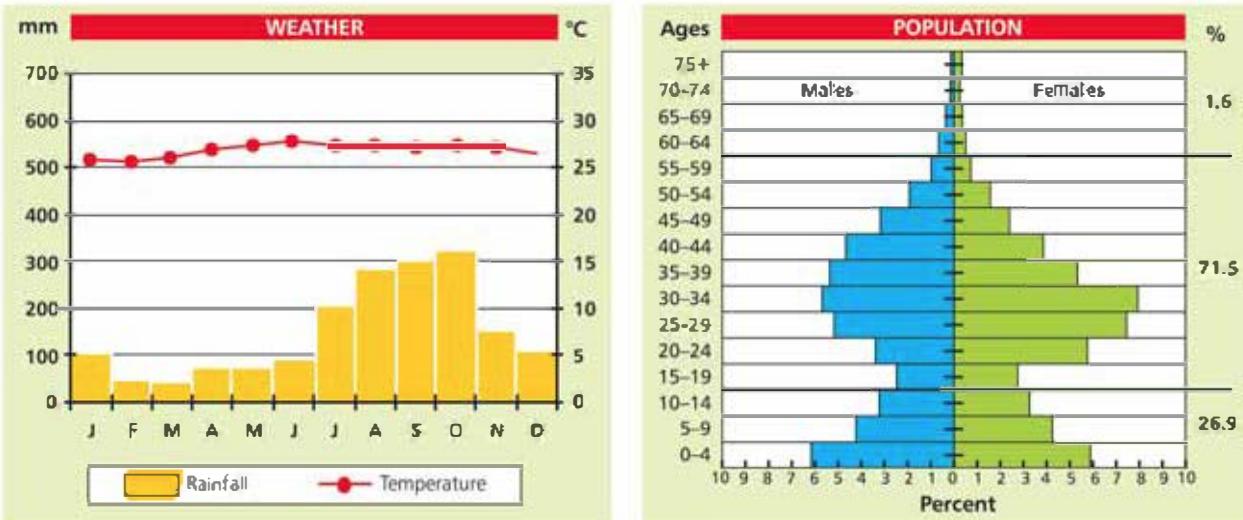


Source: Wikipedia

## General Information

Capital city	Saipan
Number of islands	22
Land area	471 sq km
Languages	English, Chamorro, Carolinian
People	Filipino (34%), Chamorro (30%), Chinese (12%), Micronesian (8%), Carolinian (5%)
Gross domestic product (GDP) per capita	\$8400
Economy	Tourism, construction, garments, handicrafts
Total population by census (2000)	69 221
Population estimated (2004)	78 000
Population density (people/km <sup>2</sup> )	166
Infant mortality rate (per 1000 live births) (2000)	5
Maternal mortality rate (per 100 000 live births)	Not available
Life expectancy at birth (1998)	75.8
Leading causes of mortality (1998)	Diseases of the heart, neoplasm, cerebrovascular diseases, perinatal conditions, motor vehicle accidents

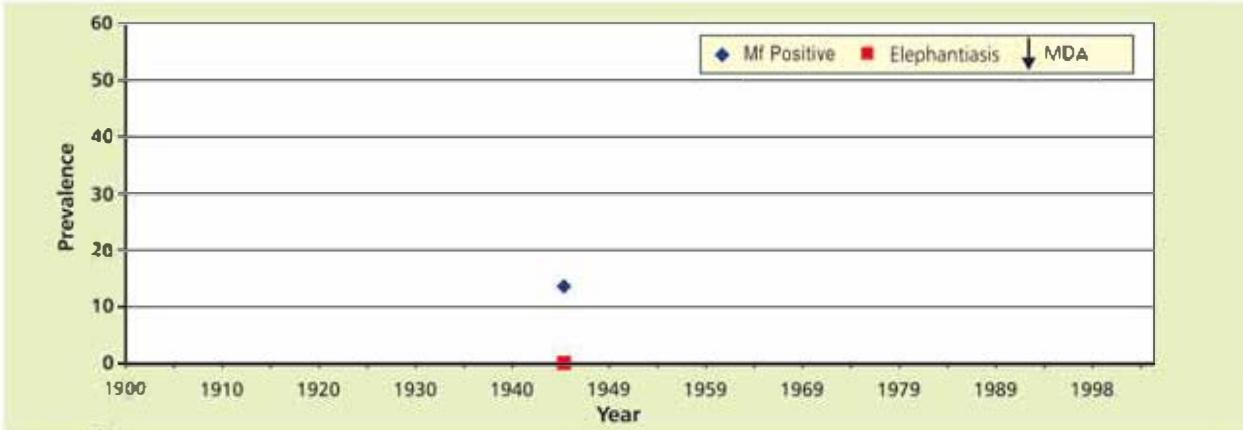
Source: Country Health Information Profile 2004 (WHO Regional Office for the Western Pacific), the Secretariat of the Pacific Community (SPC), Lonely Planet Destinations



Source: WorldClimate.  
Temperature: Saipan 1951 and 1985.  
Rainfall: Saipan 1988 and 1995.

Source: Secretariat of the Pacific Community, 2000

## 3 Filariasis before PacELF, 1900–1998



### Country Filariasis Activities in the 1900s before PacELF

#### Microfilaria Prevalence and Clinical Surveys

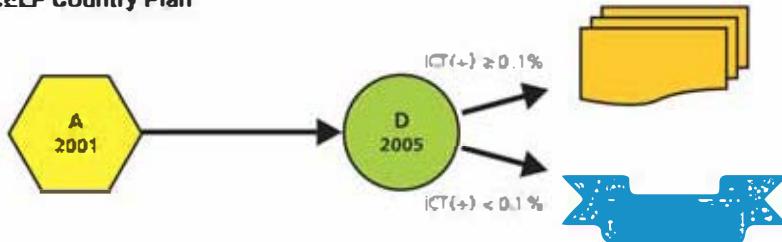
Population/Area	Date	% Mf pos (n)	Noted Clinical Features % (n)	Primary Reference
Saipan	1944	13.5 (243)	Elephantiasis: 0.0 (7000)	Knott J (1944)

#### Mass Drug Administration or Other Control Measures

Population/Area	Date	Activity	Details	Primary Reference
There are no records of any control programme in New Caledonia in the 1900s				

## 4 PacELF Activity

### PacELF Country Plan



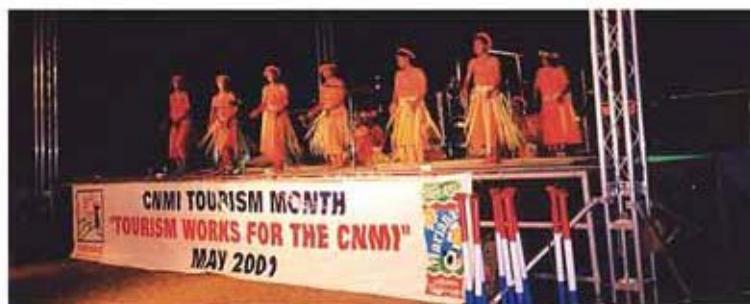
Type	Year	Sampling	Target	Result
A	2001	Convenience	3 islands including Saipan	iCT: 0% (0/980)
D	2005	LQAS	1700 all 5- to 6-year-old children	

Source: PacMAN Book 2004

### Results of Blood Surveys and MDAs under PacELF

#### Blood Surveys

Date	Method	Target	Sampling	No. examined	No. of positives	Positive rate (%)	Remarks	Reference
2001	iCT	3 islands	Elementary school	1032	0	0		Elementary school



#### Supplies Shipped from PacELF, 2000–2004

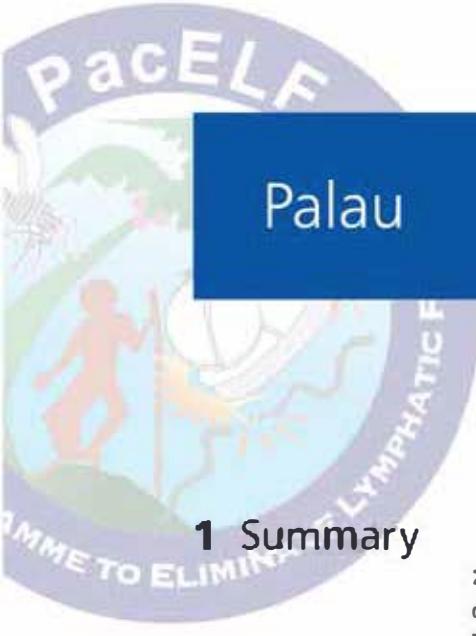
Year	2000	2001	2002	2003	2004
ALB (tablets)	-	-	-	-	-
DEC (tablets)	-	-	-	-	-
ICT (test cards)	-	2000	-	-	-

Partnership: WHO



**Operational Staff:** Department of Public Health





# Palau



## 1 Summary

The Palau archipelago of 340 islands (only nine of them inhabited) is situated between 2°–9°N and 131°–135°E, and has a total area of 494 sq km and a population of 19129 (2000 census). In 2004 the estimated population was 20 700 (SPC 2004). The capital is Koror. Palau is the westernmost group in the Caroline Islands and was formerly part of the US-administered UN Trust Territory of the Pacific Islands.

The Mf rate in the villages in 1953 ranged from 0% to 37.3%, and was estimated at 24.2% overall (Pipkin 1953). By 1967, the Mf rate had fallen to 12.6% (WHO/SPC 1974). An MDA in the early 1970s administered 5 mg/kg DEC once every other month for two years. By 1972, the Mf rate had gone down to 0.3% in 1000 persons examined (WHO/SPC 1974).

Palau joined PacELF in 1999, and participated in a baseline antigen prevalence survey in 2001 (country report 2002). Nine positive cases, all of them in Ngardmau village, were reported out of 2031 people examined (0.4%). Palau was therefore classified as a partially endemic country.

A filariasis antigen survey in 2002 (country report 2003) found three positive cases out of 131 people examined in Ngardmau (2.3%). All 141 people examined in Ngchesar were negative for filariasis. Another survey in the Southwest Islands in 2003 found no positive cases among the 98 people examined.



## 2 Country Profile

### Filariasis Type and Vectors

Filariasis latest status	Partially endemic
Filaria type	<i>Wuchereria bancrofti</i>
Mosquito vectors	<i>Culex quinquefasciatus</i>

Source: Culicidae of the Australasian Region, Volume 12, 1989



Source: MapQUEST.com

### Coat of Arms



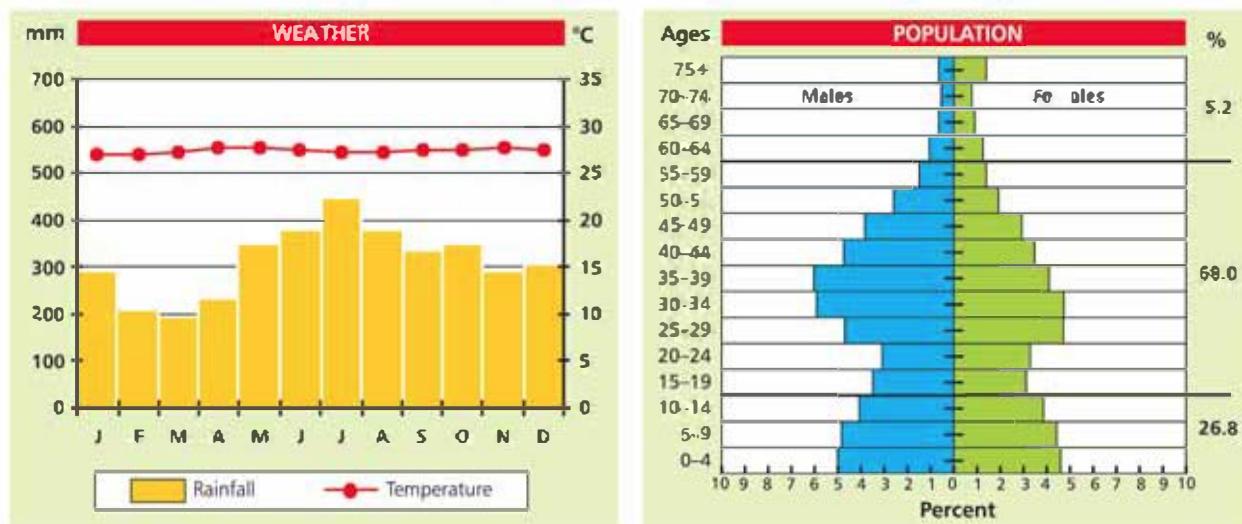
Source: Wikipedia



## General Information

Capital city	Koror
Number of islands	8 principal and 252 smaller islands
Land area	488 sq km
Languages	English, Palauan, Sonsoralese, Tobi, Angaur
People	Micronesian, Malayan, Melanesian, Asian
Gross domestic product (GDP) per capita	\$8700
Economy	Tourism, craft items, fishing, agriculture
Total population by census (2000)	19 129
Population estimated (2004)	20 700
Population density (people/km <sup>2</sup> )	42
Infant mortality rate (per 1000 live births) (2003)	15.76
Maternal mortality rate (per 100 000 live births)	Not available
Life expectancy at birth (2003)	69.5
Leading causes of mortality (2002)	Cardiovascular diseases, unknown and other, other circulatory diseases, other injuries, cancer

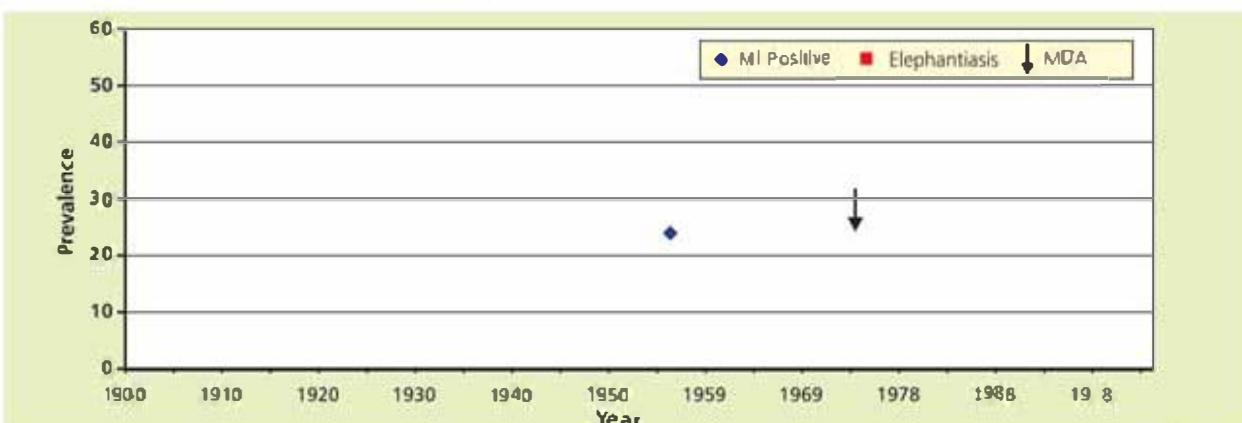
Source: Country Health Information Profile 2004 (WHO Regional Office for the Western Pacific), the Secretariat of the Pacific Community (SPC), Lonely Planet Destinations



Source: WorldClimate.  
Temperature: long 1924 to 1990,  
Rainfall: short 1924 and 1990.

Source: Secretariat of the Pacific Community, 2000

## 3 Filariasis before PacELF, 1900–1998



### Country Filariasis Activities in the 1900s before PacELF

#### Microfilaria Prevalence and Clinical Surveys

Population/Area	Date	% Mf pos (n)	Noted Clinical Features % (n)	Primary Reference
Tobi	1953	0.0 (81)		Pipkin AC (1953)
Sonsorol	1953	0.0 (59)		Pipkin AC (1953)
Angaur	1953	1.0 (102)		Pipkin AC (1953)
Pelilieu	1953	16.6 (108)		Pipkin AC (1953)
Keyengel	1953	23.0 (74)		Pipkin AC (1953)
Babeldab	1953	37.3 (510)		Pipkin AC (1953)
Koror	1953	24.1 (158)		Pipkin AC (1953)

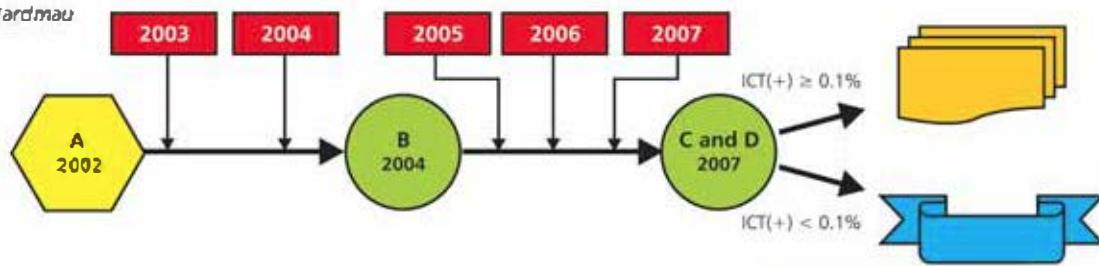
#### Mass Drug Administration or Other Control Measures

Population/Area	Date	Activity	Details	Primary Reference
Palau	1970-1971	MDA	DEC(5mg/kg), once every other month for 2yrs.	WHO/SPC (1974)

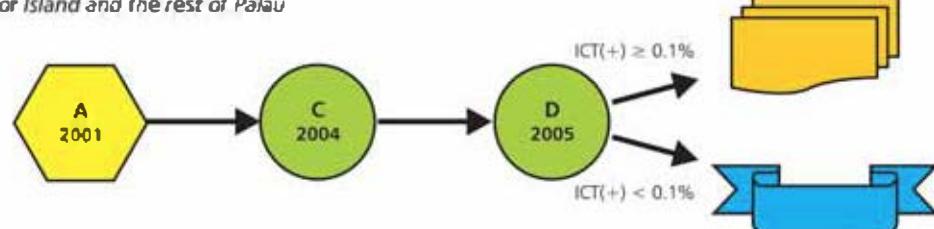
## 4 PacELF Activity

### PacELF Country Plan

For Ngardmau



For Koror Island and the rest of Palau



Type	Year	Sampling	Target	Result
A	2001	Convenience	Nationwide	ICT 0.4% (9/2031)
B		Whole population	All inhabitants Ngardmau	
C and D		Whole population	All inhabitants Ngardmau	
C		Cluster	Nationwide (except Ngardmau)	
D	2005	LQAS	400 all 5- to 6-year-old children (except Ngardmau)	

Source: PacMAN Book 2004

### Results of Blood Surveys and MDAs under PacELF

#### Blood Surveys

Date	Method	Target	Sampling	No. examined	No. of positives	Positive rate (%)	Remarks	Reference
Jun-Sep/2001	ICT	14 states	Stratification for locations and convenience sampling	2031	9	0.4	Positive cases are from Ngardmau mainly	Presentation in AMS
Nov-02	ICT	Ngardmau (sentinel site)	Convenience sampling	131	3	2.3		Presentation in AMS
Dec-02	ICT	Ngchesar	Convenience sampling	141	0	0.0		Presentation in AMS
Jun-July/2003	ICT	South West Islands	Convenience sampling	98	0	0.0		Presentation in AMS



**Supplies Shipped from PacELF, 2000-2004**

Year	2000	2001	2002	2003	2004
ALB (tablets)	-	-	-	-	1000
DEC (tablets)	-	-	-	-	10 000
ICT (test cards)	2500	2000	2000	2000	1000

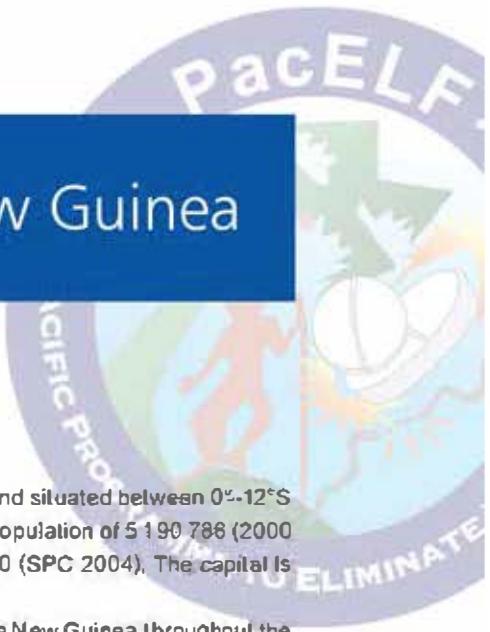
Partnership: WHO, JICA (DEC, ICT)

**Operational Staff:** Public health staff





## Papua New Guinea



### 1 Summary

Papua New Guinea has about 600 islands and a mainland situated between 0°–12°S and 141°–160°E. It has a land area of 473 180 sq km and a population of 5 190 786 (2000 census). The population in 2004 was estimated at 5 695 300 (SPC 2004). The capital is Port Moresby.

Many studies of MI prevalence were carried out in Papua New Guinea throughout the 20th century. The first survey recorded was in the coastal belt of Port Moresby and North Samarai to the Mambaré River in 1912 (Breinl 1915). Twenty-four positives were found among 166 people examined (15.0%) and elephantiasis cases were seen in varying numbers. In 1930–1935 a blood and clinical survey was carried out on Makada island, Matty island, and Rabaul (Backhouse and Haydon 1950). The Mf rates were 22.7% in Makada, 25.3% in Matty, and 19.4% in Rabaul. In 1944–1945 a survey in the Milne Bay area found Mf rates of 33%–55% (Hopla 1946). In 1950, the prevalence range in five villages was 0.0%–44.0% (Bearup and Laurence 1950).

Mf surveys from 1966 to 1989 found prevalence rates varying from 0% in Gembogl to 68% in the Ambunti-Dreikir region of East Sepik Province. In 1990–1999, studies using Knotl's method, or Og4C3, were described. The Mf prevalence range was 0%–68% and the anaemia range was 0%–82%.

Papua New Guinea joined PacELF in 1999. In May of that year, the Government recognized filariasis as a public health priority. It joined forces with the private sector in the fight against the disease. Some private companies (OK Tedi Mining in 1987–1989, Misima Mining in 1996–2001, Litir in 2000–2001, and Porgor in 2000–2001) have complete MDAs in their areas, and some campaigns have also been conducted in the Western Province and the East Sepik region with external funding and assistance. More recent extensive baseline surveys with the ICT test in every district in the country have established the overall prevalence to be around 6% (country plan 2004).

Papua New Guinea began MDA with PacELF in May 2005.



## 2 Country Profile

### Filariasis Type and Vectors

Filariasis latest status	Endemic
Filaria type	<i>Wuchereria bancrofti</i> Nocturnally periodic
Mosquito vectors	<i>Anopheles punctulatus</i> <i>Culex quinquefasciatus</i> <i>Anopheles farauti</i> , <i>Anopheles koliensis</i> <i>Mansonia uniformis</i> , <i>Ochlerotatus kochi</i>

Source: Culicidae of the Australasian Region, Volume 12, 1989



Source: MapQuest.com

### Coat of Arms



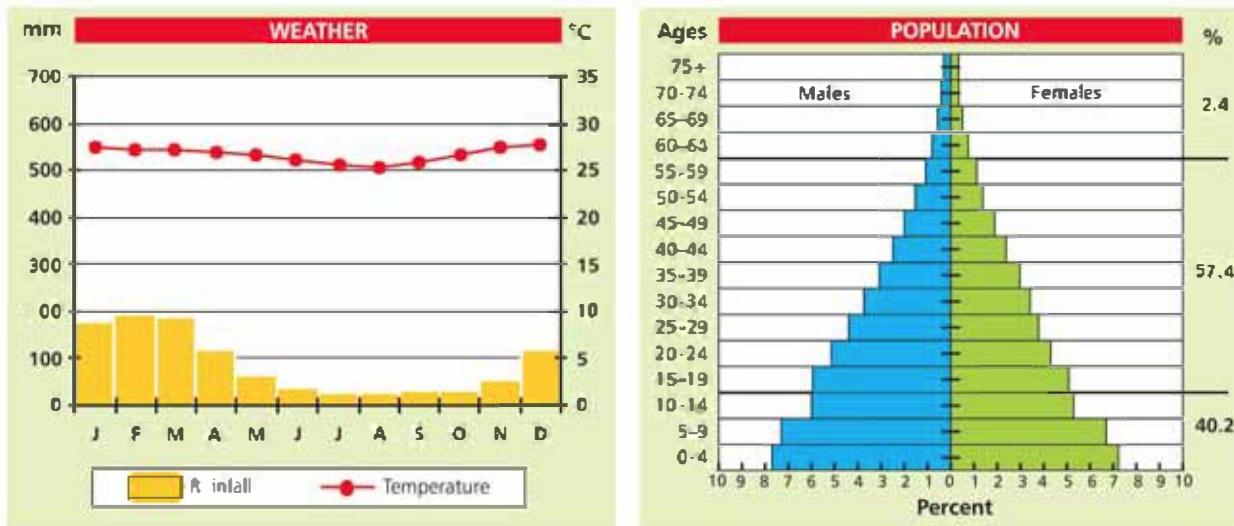
Source: Wikipedia



## General Information

Capital city	Port Moresby
Number of islands	600
Land area	462 243 sq km
Languages	English 1%2%, pidgin English, Motu (Papua region), 715 indigenous languages
People	Melanesian, Papuan, Negrito, Micronesian, Polynesian
Gross domestic product (GDP) per capita (2001)	\$497
Economy	Coffee, copper, gold, silver, copra crushing, palm oil, logging
Total population by census (2000)	5 190 786
Population estimated (2004)	5 695 300
Population density (people/km <sup>2</sup> )	12
Infant mortality rate (per 1000 live births) (2000)	64
Maternal mortality rate (per 100 000 live births) (1996)	370
Life expectancy at birth (2000)	53.0
Leading causes of mortality (2002)	Pneumonia, perinatal conditions, malaria, tuberculosis, meningitis

Source: Country Health Information Profile 2004 (WHO Regional Office for the Western Pacific), Secretariat of the Pacific Community (SPC), Lonely Planet Destinations.



Source: World Bank,  
Temperature: Port Moresby 1903 to 1991,  
Rainfall: Port Moresby 1891 and 1990

Source: Secretariat of the Pacific Community, 2000



## 3 Filariasis before PacELF

### Country Filariasis Activities in the 1900s before PacELF

#### Microfilaria Prevalence and Clinical Surveys

Population/Area	Date	% MF pos (n)	Noted Clinical Features % (n)	Primary Reference
Coastal belt of Port Moresby and North of Samaia as far as Mambare River	1912	Thin smears: 14.5 (166)		Brein A (1915)
Coastal belt of East New Guinea	1912–1913		Elephantiasis; Seen in varying numbers, patchy distribution marked	Brein A (1915)
Coastal region West of Port Moresby as far as Daru	1913	Thin smears: 4.8 (166)		Brein A (1915)
Labourers from various regions of Melanesia, tested at Rabaul, New Britain	1930–1935	from NE New Guinea 25.3 (174); from New Britain 7.6 (172)	Elephantiasis: 0.7 (427) Enlargement of epitrochlear glands: 29.7 (390)	Backhouse TC, Leydon GM (1950)
Makanda Island, New Britain	1930–1935		Enlargement of epitrochlear glands: 60.9 (220)	Backhouse TC, Leydon GM (1950)
Busama area	1950	20.8 (24)		Bearup AJ, Lawrence JJ, (1950)
Kaiapit	1950	44.0 (25)		Bearup AJ, Lawrence JJ, (1950)
Patep	1950	0.0 (15)		Bearup AJ, Lawrence JJ, (1950)
Kavataria	1950	16.9 (65)		Bearup AJ, Lawrence JJ, (1950)
Purari Delta	1950	30.0 (10)		Bearup AJ, Lawrence JJ, (1950)
Trobriand Islands	1966	15.2 (310)		Desowitz RS, Saave JJ, Sawada T (1966)
Cape Gloucester, New Britain	1966	17.2 (203)		Desowitz RS, Saave JJ, Sawada T (1966)
Gembogl, Eastern Highlands	1966	0.0 (73)		Desowitz RS, Saave JJ, Sawada T (1966)
Middle Fly, Western	1974	52 (233)		Knight et al (1979)
North Fly, Western	1983	34 (800)		Cattani et al. (1983)
Ambunti-Drekikir, East Sepik Province	1984	Filtration: 68 (99)		Kazura et al. (1984)
Komo-Margarim, SHP	1991	Filtration: 95 (220)		Prylbski et al. (1994)

#### Mass Drug Administration or Other Control Measures

Population/Area	Date	Activity	Details	Primary Reference
OK Tedi Mines, Western Province	1987–1989	DEC		Country Presentation, PacELF Meeting 2001
Misima Mines, Milne Bay Province	1996–2001	DEC with albendazole		Country Presentation, PacELF Meeting 2001

## 4 PacELF Activity

Papua New Guinea follows WHO Guideline and began MDA with PacELF in May 2005.

#### Supplies Shipped from PacELF, 2000–2004

Year	2000	2001	2002	2003	2004
ALB (tablets)	-	8000	2000	-	350 000
DEC (tablets)	-	800 000	20 000	25 240 000	3 660 000
ICT (test cards)	-	5000	10 000	15 000	5000

Partnership: WHO, JI-A (DEC, ICT), GSK (albendazole), James Cook University (technical/financial support)



## IEC Materials



**Operational Staff:** Department of Public Health





## Pitcairn Islands



### 1 Summary

The Pitcairn Islands comprises four islands located at 25°S and 130°W. It is a British dependency with a land area of 37 sq km and a population of 48 (2002 census).

No cases were found in any of the 54 people examined in 1953 (Beye et al. 1953).

In 1999 the Pitcairn Islands joined PacELF. An antigen prevalence survey of all inhabitants in March 2002 (country report 2002) found no positive cases among 33 people examined. Clinical cases were not observed at that time. The Pitcairn Islands was therefore classified as a non-endemic country. Additional filariasis activities have not been undertaken since this survey.



## 2 Country Profile

### Filariasis Type and Vectors

Filariasis latest status	Non-endemic
Filaria type	<i>Wuchereria bancrofti</i>
Mosquito vectors	<i>Aedes polynesiensis</i>

Source: Culicidae of the Australasian Region, Volume 12, 1989.



Source: MapQuest.com

### Coat of Arms



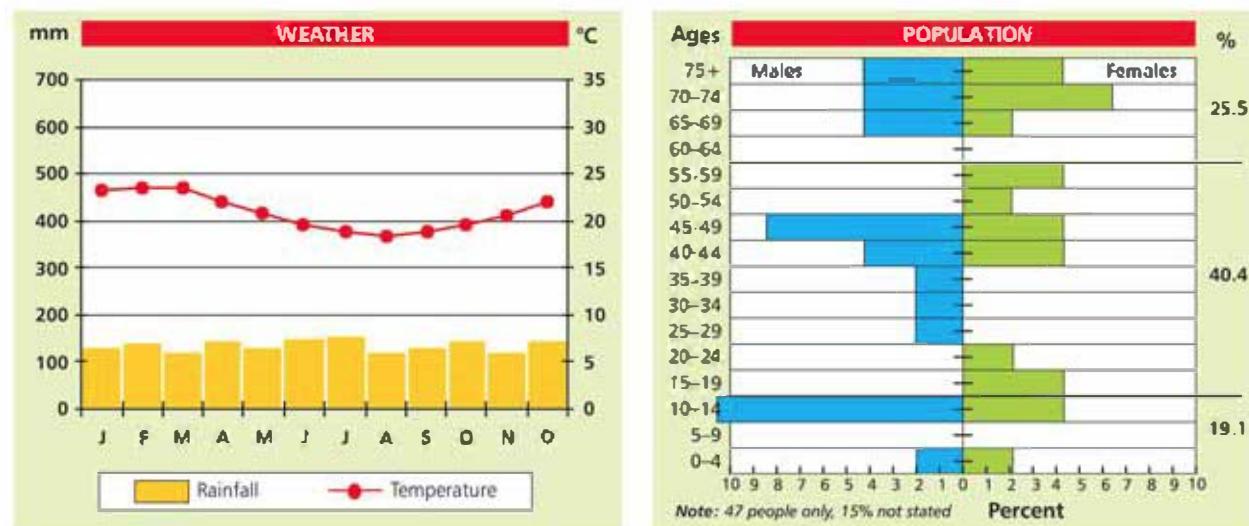
Source: Wikipedia



## General Information

Capital city	Adamstown
Number of islands	4
Land area	39 sq km
Languages	English
People	Polynesian and European
Gross domestic product (GDP) per capita	Not available
Economy	Not available
Total population by census (2002)	48
Population estimated (2003)	50
Population density (people/km <sup>2</sup> )	1
Infant mortality rate (per 1000 live births)	Not available
Maternal mortality rate (per 100 000 live births)	Not available
Life expectancy at birth	Not available
Leading causes of mortality	Not available

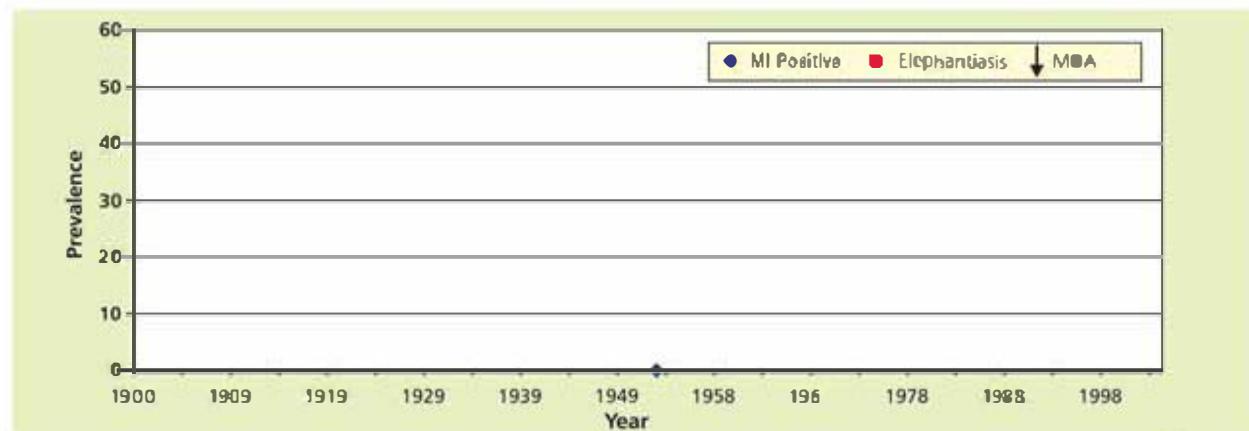
Source: Country Health Information Profile 2004 (WHO Regional Office for the Western Pacific), Secretariat of the Pacific Community (SPC), Lonely Planet Destinations



Source: WorldClimate  
Temperature: Pitcairn 1940 to 1983,  
Rainfall: Pitcairn 1940 and 1981

Source: Secretariat of the Pacific Community, 2000

## 3 Filariasis before PacELF, 1900–1998



## Country Filariasis Activities in the 1900s before PacELF

### Microfilaria Prevalence and Clinical Surveys

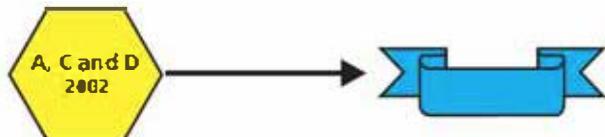
Population/Area	Date	% Mf pos (n)	Noted Clinical Features % (n)	Primary Reference
There are no epidemiologic records in the 1900s				

### Mass Drug Administration or Other Control Measures

Population/Area	Date	Activity	Details	Primary Reference
There are no records of control programs in the 1900s				

## 4 PacELF Activity

### PacELF Country Plan



Type	Year	Sampling	Target	Result
A	2002	Whole population	All inhabitants	ICT: 0% (0/33)

Source: PacELF Year Book 2004

### Results of Blood Surveys and MDAs under PacELF

#### Blood Surveys

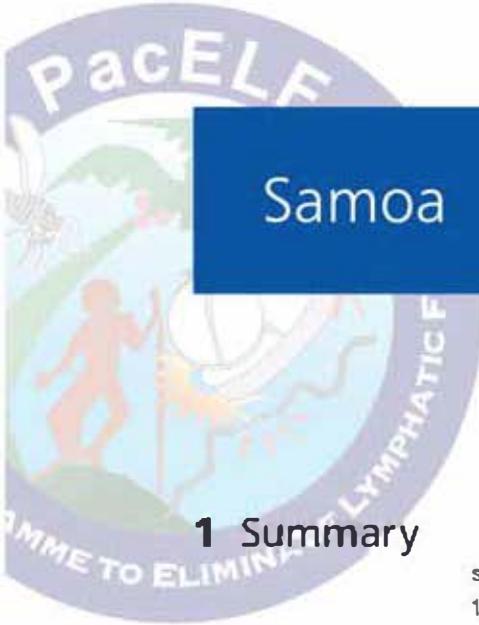
Date	Method	Target	Sampling	No. examined	No. of positives	Positive rate (%)	Remarks	Reference
Mar-02	ICT	Whole area	All inhabitants	33	0	0		Gov. Report (10/04/02)

#### Supplies Shipped from PacELF, 2000-2004

Year	2000	2001	2002	2003	2004
ALB (tablets)	-	-	-	-	-
DEC (tablets)	-	-	-	-	-
ICT (test cards)	-	50	-	-	-

Partnership: WHO





# Samoa



## 1 Summary

Samoa consists of nine islands located at 14°S and 172°W. It has a land area of 2935 sq km and a population of 176 710 (2001 census). The estimated population in 2004 was 182 700 (SPC 2004).

Between 1878 and 1914, many scientists described the frequent occurrence of patients with elephantiasis (reviewed in Sasa 1976). Surveys in the 1920s found elephantiasis rates of 2.7%–5.6% and hydrocoele rates of 13.5%–17.1%. Many studies of Mf prevalence have been completed. Mf rates of 23.7% on Upolu (Upolu) and 41% on Savaii were reported in 1928 (Buxton 1928), and 19.2% on Upolu and 24.1% on Savaii in 1954 (Iyengar 1954). A nationwide survey of 10 129 people in 21 villages in 1965 recorded an Mf rate of 19.1%.

An MDA with DEC in 1965–1967 reduced the Mf rate to 1.6% in 1972. Seven other MDAs with DEC were completed (1971, 1982, 1983, 1986, 1993, 1994, 1995), followed by two MDAs with DEC and ivermectin in 1996 and 1997 (unpublished country data). Despite these efforts, Mf rates have never reached 0%. The lowest Mf rate recorded was 0.14% in 5145 people tested in 1973, but a survey of more than 10 000 people in 1982, found Mf rates of more than 5%. The national Mf survey in 1998 found an Mf rate of 1.1% (43 out of 4054 positive).

In 1999 Samoa joined PacELF. Nationwide baseline ICT antigen tests in 27 villages later that year found 317 antigen-positives in 7006 people examined (4.5%) (country report). Samoa is thus considered an endemic country.

Yearly MDAs using DEC (6 mg/kg) and albendazole (400 mg) began in 1999 under PacELF. The first MDA covered 145 952 people for a reported coverage of 90.5% (1999 country report). In 2000 a blood survey at three sites after the first MDA (country report 2001) found an Mf rate of 8.0% among 88 people examined and an antigen-positive rate of 8.1% among 676 people examined.

The second MDA in 2000 covered 91 613 (56.8%) (country report). After this MDA, a blood survey in four villages in 2001 (country presentation at Fourth PacELF Annual Meeting in 2002) found an Mf rate of 14.9% among 67 people examined and an antigen-positive rate of 4.8% among 1392 people examined. The third MDA in 2001 covered 119 100 people for a coverage of 68.4% (country presentation at Fourth PacELF Annual Meeting in 2002). After the third MDA, a blood survey in 10 villages in 2002 (country presentation at Fifth PacELF Annual Meeting in 2003) found Mf prevalence to be 0.3% among 2265 people examined, and the antigen-positive rate to be 4.5% among 2141 people examined. The fourth MDA covered 106 561 (60.3% coverage) (country presentation at Fifth PacELF Annual Meeting in 2003). After the fourth MDA, a blood survey in six villages in 2003 found an Mf rate of 0.7% and an antigen-positive rate of 1.6% among 881 people examined. Samoa completed its fifth MDA in 2003, with 140 855 people treated (79.7%). The final evaluation survey of 2004 found Mf prevalence of 0.4% and antigen prevalence of 1.1% in 12 719 people tested.

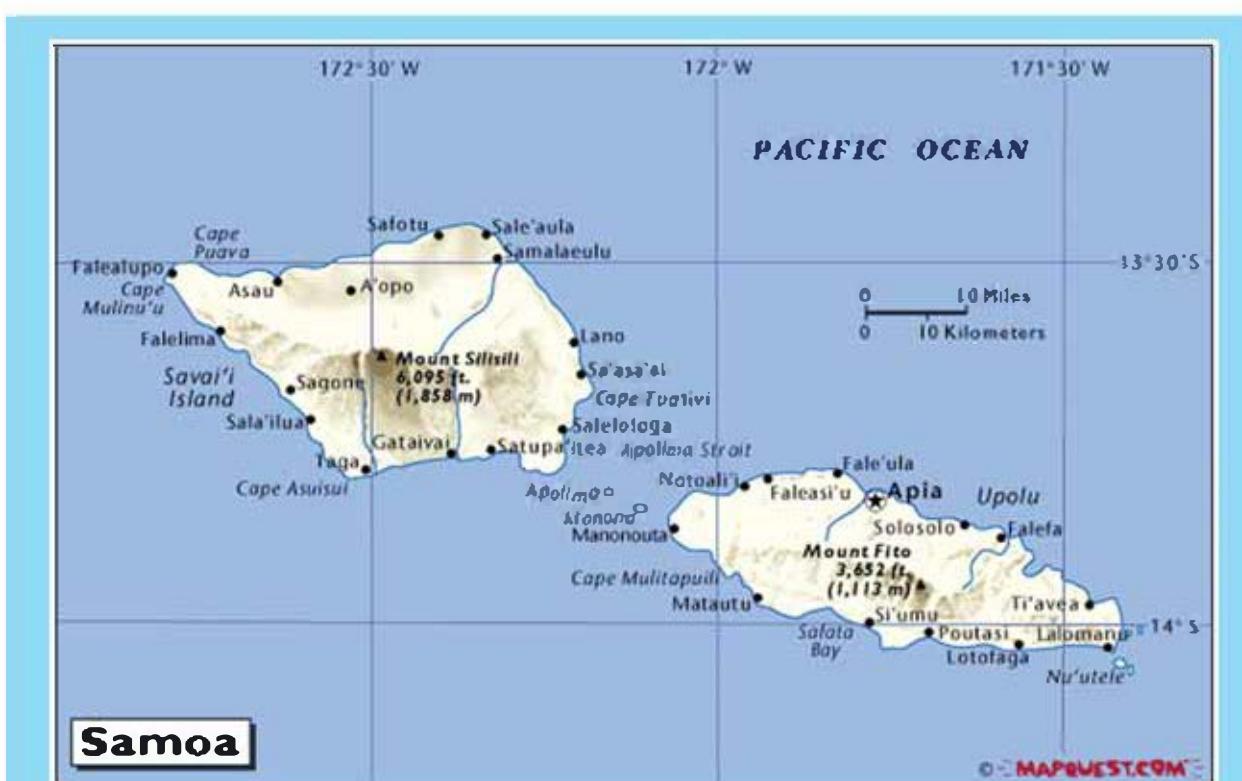


## 2 Country Profile

### Filariasis Type and Vectors

Filariasis latest status	Endemic
Filaria type	<i>Wuchereria bancrofti</i> Diurnally sub-periodic
Mosquito vectors	<i>Aedes polynesiensis</i> , <i>Aedes upolensis</i> <i>Aedes oceanicus</i> <i>Aedes samoanus</i> <i>Aedes tutuilae</i>

Source: Culicidae of the Australasian Region, Volume 12, 1989



Source: MapQuest.com

### Coat of Arms



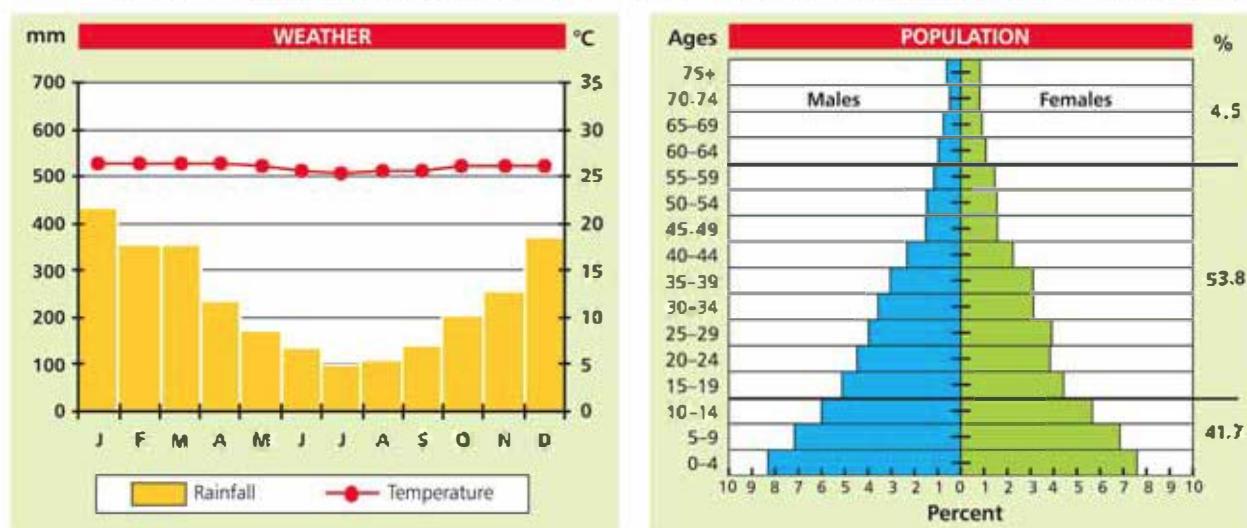
Source: Wikipedia



### General Information

Capital city	Apia
Number of islands	2 Islands and 6 Islets
Land area	2935 sq km
Languages	Samoa, English
People	Samoa (93%), Euronesians (7%)
Gross domestic product (GDP) per capita (2001)	\$1443
Economy	Tourism, food processing, building materials, auto parts
Total population by census (2001)	176 848
Population estimated (2004)	182 700
Population density (people/km <sup>2</sup> )	62
Infant mortality rate (per 1000 live births) (2001)	19.3
Maternal mortality rate (per 100 000 live births) (2002)	19.6
Life expectancy at birth (2001)	72.8
Leading cause of mortality (2002)	Cerebrovascular diseases, septicaemia, congestive heart failure, pneumonia, myocardial infarction

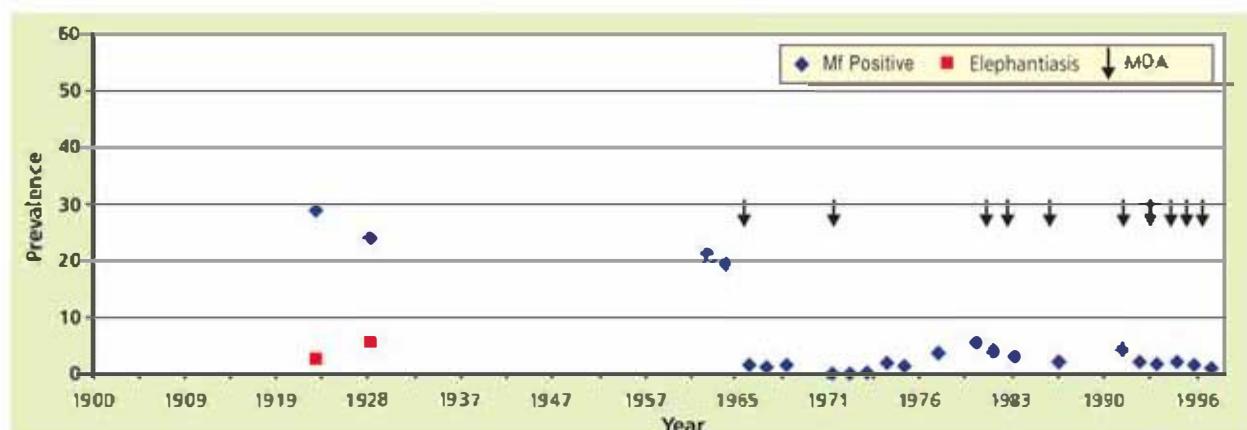
Source: Country Health Information Profile 2004 (WHO Regional Office for the Western Pacific), Secretariat of the Pacific Community (SPC), Lonely Planet Destinations.



Source: WorldClimate.  
Temperature: Apia 1890 and 1990.  
Rainfall: Apia 1890 and 1990.

Source: Secretariat of the Pacific Community, 2000

### 3 Filariasis before PacELF, 1900–1998



## Country Filariasis Activities in the 1900s before PacELF

### Microfilaria Prevalence and Clinical Surveys

Population/Area	Date	% Mf pos (n)	Noted Clinical Features % (n)	Primary Reference
Eastern (American) and Western Samoa	1923	28.7 (4294)	Elephantiasis: 2.7 (4294)	O'Conner FW (1923)
Upolu	1928	23.7 (1103)	Elephantiasis: 5.6 (1103)	Buxton PA (1928)
	1964	21.1 (2077)		Country data
21 villages	1965	19.1 (10 129)		Country data
	1967	1.6 (42 697)		Country data
	1968	1.3 (5371)		Country data
	1969	1.7 (7393)		Country data
	1972	0.24 (6361)		Country data
	1973	0.14 (5145)		Country data
	1974	0.33 (30 272)		Country data
	1975	2.1 (11 499)		Country data
	1976	1.4 (3649)		Country data
28 villages	1979	3.8 (8385)		Kimura E, Spears GFS, Singh KI (1985)
27 villages	1982	5.3 (10 361)		Kimura E, Spears GFS, Singh KI et al (1992)
27 villages	1983	4.2 (9627)		Kimura E, Spears GFS, Singh KI et al (1992)
34 villages	1984	2.8 (11 146)		Kimura E, Spears GFS, Singh KI et al (1992)
26 villages	1987	2.3 (13 708)		Kimura E, Spears GFS, Singh KI et al (1992)
	1993	4.3 (10 256)		Ichimori K (2001)
	1994	2.2 (10 112)		Ichimori K (2001)
	1995	1.9 (4551)		Ichimori K (2001)
	1996	2.2 (5997)		Ichimori K (2001)
	1997	1.7 (8305)		Ichimori K (2001)
Nationwide	1998	1.1 (4054)		Ichimori K (2001)



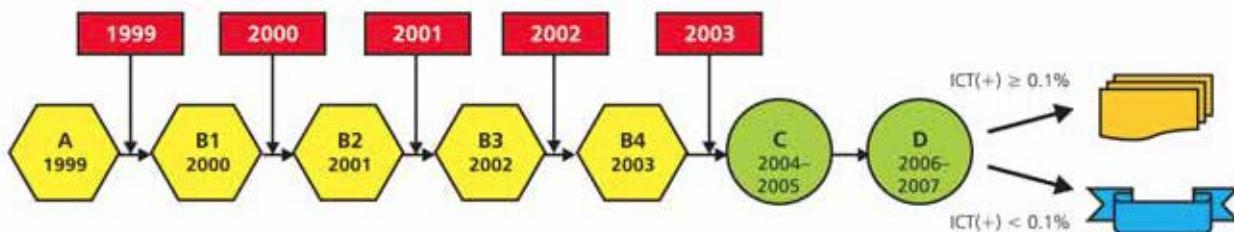
### Mass Drug Administration or Other Control Measures

Population/Area	Date	Activity	Details	Primary Reference
	8/1965– 10/1965	DEC MDA 5mg/kg once a week for 6 weeks followed by monthly dose for 12 Months	94.6 coverage for first dose, 20.4 took all 18 doses	Kimura E, Spears GFS, Singh KI (1985)
	1/1981	DEC MDA 6mg/kg monthly for 12 months	98.8 coverage for 1 dose, 46.1 coverage for all 12 doses	Kimura E, Spears GFS, Singh KI (1985)
	1982	DEC MDA 6mg/kg 1 dose		Kimura E, Spears GFS, Singh KI et al (1992)
	1983	DEC MDA 6mg/kg 1 dose		Kimura E, Spears GFS, Singh KI et al (1992)
	1986	DEC MDA 6mg/kg 1 dose		Kimura E, Spears GFS, Singh KI et al (1992)
Nationwide	1993	DEC (6mg/kg) single dose treatment		Ichimori K (2001)
Nationwide	1994	DEC (6mg/kg) single dose treatment		Ichimori K (2001)
Nationwide	1995	DEC (6mg/kg) single dose treatment		Ichimori K (2001)
Nationwide	1996	DEC (6mg/kg) and ivermectin (200ug/kg)		Ichimori K (2001)
Nationwide	1997	DEC (6mg/kg) and ivermectin (200ug/kg)		Ichimori K (2001)



## 4 PacELF Activity

### PacELF Country Plan



Type	Year	Sampling	Target	Result
A	1999	Convenience	Countrywide	ICT: 4.5% (317/7006)
B	2002	Cluster	Sentinel sites	ICT 4.5% (96/2141), Mf 0.3% (6/2265)
C	2004–2005	Cluster	Stratified survey	
D	2006–2007	Complete	4800 all 5- to 6-year-old children	

Source: PacMAN Book 2004

### Results of Blood Surveys and MDAs under PacELF

#### Blood Surveys

Date	Method	Target	Sampling	No. examined	No. of positives	Positive rate (%)	Remarks	Reference
1999	ICT	27 villages	convenience sample	7006	317	4.5		BS 99 Report
2000	ICT	Sentinel sites (3 villages)	convenience sample	676	55	8.1		BS Report (May/01)
2000	Mf	Sentinel sites (3 villages)	convenience sample	88	7	8.0		BS Report (May/01)
2001	ICT	Sentinel sites (4 villages)	convenience sample	1392	67	4.8		Presentation in AM4
2001	Mf	Sentinel sites (4 villages)	convenience sample	67	10	14.9		Presentation in AM4
2002	ICT	Sentinel sites (10 villages)	convenience sample	2141	96	4.5		Presentation in AM4
2002	Mf	Sentinel sites (10 villages)	convenience sample	2265	6	0.3		Presentation in AM4
2003	ICT	Sentinel sites (6 villages)	convenience sample	881	14	1.6		Presentation in AM5
2003	Mf	Sentinel sites (6 villages)	convenience sample	881	6	0.7		BS Report (Email 30/07/03)
2004	ICT	Whole area	stratified cluster sampling	12 719	144	1.1		APW Report (11/04/05)
2004	Mf	Whole area	stratified cluster sampling	12 719	55	0.4		APW Report (11/04/05)



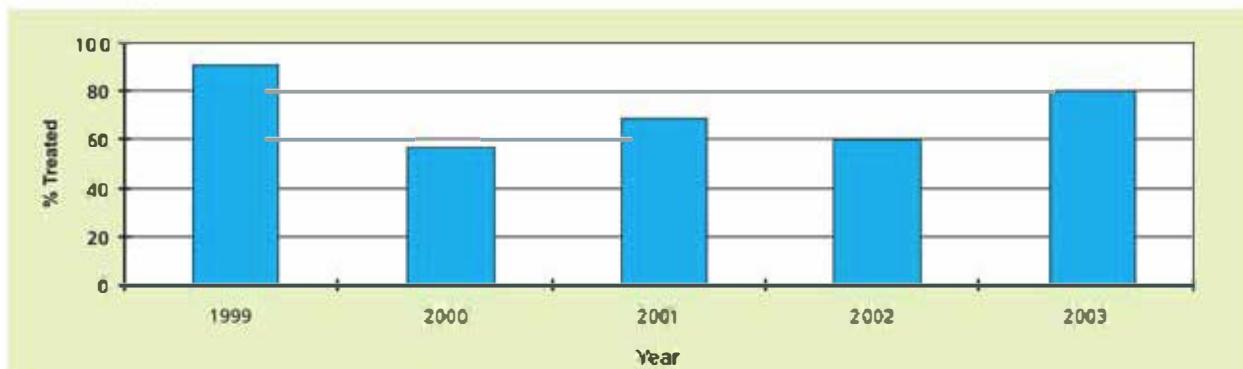
#### MDAs

Date	MDA	Reported population	Estimated population*	Registered population	% Registered	Treated population	% Treated / Reported	% Treated / Estimated*	% Treated / Registered	Reference
1999	1st	161 298	172 717	152 022	94.3	145 952	90.5	84.5	96.0	MDA 99 Report
2000	2nd	161 298	174 713	95 196	59.0	91 613	56.8	52.4	96.2	MOH Report
2001	3rd	174 140	176 710	127 198	73.0	119 100	68.4	67.4	93.6	Presentation in AM4
2002	4th	176 848	178 707	115 086	65.1	106 561	60.3	59.6	92.6	Presentation in AM5
2003	5th	176 848	180 703	150 596	85.2	140 855	79.7	77.9	93.5	Presentation in AM6

\*Estimated assuming constant growth rate between latest census and 2004 population estimate (SPC)

## The PacELF Way Towards the Elimination of Lymphatic Filariasis in the Pacific

### MDA Coverage, 1999–2003



### Supplies Shipped from PacELF, 2000–2004

Year	2000	2001	2002	2003	2004
ALB (tablets)	-	170 000	170 000	200 000	-
DEC (tablets)	-	1 260 000	1 200 000	1 500 000	-
ICT (test cards)	-	3000	5000	5000	15 000

Partnership: WHO, GSK (albendazole), JICA (DEC and ICT), JOCV (Volunteers)

### Distribution Dose of DEC and Albendazole Tablets

Age	No. of DEC (50 mg) tablets	No. of albendazole (400 mg) tablets
2–4	2	1
5–9	3	1
10–14	5	1
15–19	7	1
20–49	9	1
50+	8	1

### Registration Form

 <b>Government of Samoa</b> <b>Ministry of Health</b> <b>Filariasis Control Project</b> <b>Division Preventive Health Services</b>	 <b>Suva o le aiga (Family name)</b> <b>Faslapotopotoga (Organization)</b>						
<b>APIRESITARA FAAINUGAVA I LAUATELE MO LEGAREGASOLO MUMU TUILPA</b> <i>Registration Book for Filaria 5<sup>th</sup> MDA</i>							
<b>IGIDA FAALAPOTOPOTOGA (Organization)</b> <input type="checkbox"/> <b>FAALAPOTOPOTOGA</b> <input type="checkbox"/> <b>TAUTUA</b> <b>NUU (Village)</b> <b>ITUMALO (Health Doctor)</b> <b>ASO (Date)</b> <b>LAU (LUPU SAMOA)</b> <b>IPU</b>							
<b>AOFA O AIGA (Number of families)</b> <b>AOFA O ALIIF (Number of males)</b> <b>AOFA O TAMAITAI (Number of females)</b> <b>AOFA O TAGATA (Total registered population)</b> <b>AOFA O FEALAU = DEC</b> <b>= ALBENDAZOLE</b>							
<small>General Address: Filaria Control Project Office Private Mail Bag, Apia P.O. Box 3071, Apia, Samoa Telephone: (685) 22220</small>							
<small>Produced by: Filaria Control Project and MDA, Ministry of Health</small>							
<table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th style="text-align: left;">Name/Village:</th> <th style="text-align: left;">Date:</th> </tr> </thead> <tbody> <tr> <td style="height: 100px;"></td> <td style="height: 100px;"></td> </tr> <tr> <td style="text-align: center;">Autofill</td> <td style="text-align: center;"> <input type="checkbox"/> Male (+)  <input type="checkbox"/> Female (-)  <input type="checkbox"/> Male (+)  <input type="checkbox"/> Female (-)  <input type="checkbox"/> Male (+)  <input type="checkbox"/> Female (-)         </td> </tr> </tbody> </table>		Name/Village:	Date:			Autofill	<input type="checkbox"/> Male (+) <input type="checkbox"/> Female (-) <input type="checkbox"/> Male (+) <input type="checkbox"/> Female (-) <input type="checkbox"/> Male (+) <input type="checkbox"/> Female (-)
Name/Village:	Date:						
Autofill	<input type="checkbox"/> Male (+) <input type="checkbox"/> Female (-) <input type="checkbox"/> Male (+) <input type="checkbox"/> Female (-) <input type="checkbox"/> Male (+) <input type="checkbox"/> Female (-)						



## IEC Materials

**T-shirt**

**FAAINUGA VAI O  
LE MUMU**

**ASO:**  
**Upolu 4-10 Julai 1993**  
**Savaii 11-17 Julai 1993**

**E MANAOPIA LE  
INU FUALAAU O  
TAGATA UMA**

**'E sili le Puipuia  
i lo le Togafitia'**

**Fa'ainuga Fuala'u  
Iona 5 o le  
Mumu Tutupe i Samoa**

**PUIPUIA MAI I LE MUMU**  
**INU UMA FUALAAU I TAIMI FAATONUINA**

**Amata Aso  
5 Oketopa 2003**

**Health promotion services**

**Samoan Ministry of Health**

**Tautou Lou Tino**

**Fa'amama ou Tafafale**

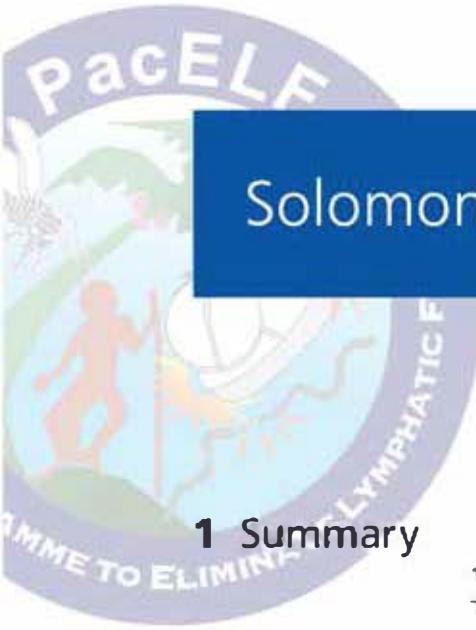
**Fa'atamaia Namu**

**Samoa Ministry of Health  
Health Promotion Services**



**Operational Staff:** Filariasis control unit, health inspector, public health nurses





# Solomon Islands



## 1 Summary

The Solomon Islands is composed of 992 islands situated between 5°–12°S and 155°–170°E. It has a total land area of 28 370 sq km and a population of 409 042 (1999 census). The population in 2004 was estimated at 460 100 (SPC 2004).

In 1945, the Mf prevalence was 10.2% on Guadalcanal, 10.2% on Malaita, and 31.5% on San Cristobal (Schlosser 1945). In 1965 the prevalence was 28.5% on Guadalcanal and 40.2% in the Florida Islands (Malaika 1965). Large-scale vector control spraying programmes for malaria eradication were conducted in the 1960s and 1970s, eliminating one vector, *Anopheles koliensis*, and possibly interrupting the transmission of filariasis (Webber 1975).

The Solomon Islands Medical Training and Research Institute (SIMTRI) conducted a clinical survey in all provinces except Malaita and Choiseul in 1998. Information was collected in two ways: through peripheral health workers and through surveillance workers. The health workers reported 104 elephantiasis and 40 hydrocoele cases. The average age was 51, with a range of 4 to 81 years; 67% of the cases were among males. The surveillance workers reported 66 elephantiasis cases and 10 hydrocoele cases. The average age of cases was 48, with a range of 14 to 70 years; 58% of the cases were males.

In 1999, Solomon Islands joined PacELF. An antigen prevalence survey later that year (SIMTRI 1999–2000) found no filariasis antigen-positive cases among 3035 people examined in eight provinces. In 2001, a survey was conducted in remote villages of Western and Temotu provinces, which were not fully covered by the residual spraying programme during the malaria eradication period. Five hundred people in the Western Province and another 500 in Temotu Province were examined by ICT; all were negative. Solomon Islands was classified as a non-endemic country according to these survey results. In 2003, 11 364 people were surveyed in the 10 provinces, and 30 (0.26%) were found to be positive.



## 2 Country Profile

## **Filariasis Type and Vectors**

<b>Filarisis latest status</b>	Non-endemic
<b>Filaria type</b>	<i>Wuchereria bancrofti</i>
<b>Mosquito vectors</b>	<i>Anopheles farauti</i> , <i>Anopheles punctulatus</i>

Source: Culicidae of the Australasian Region, Volume 12, 1989



Source: ManQuest.com



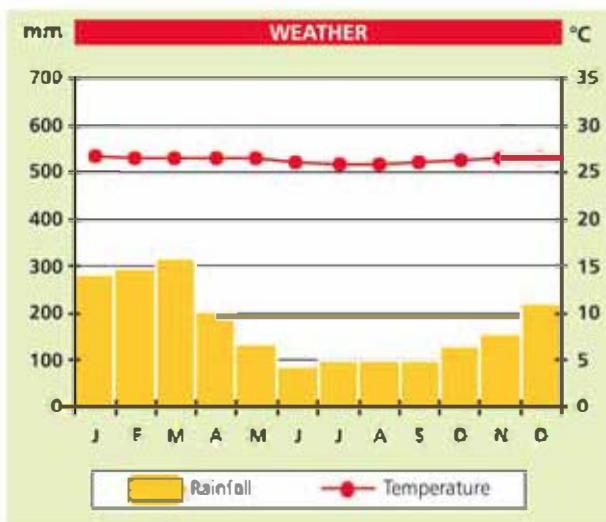
Source: Wikipedia



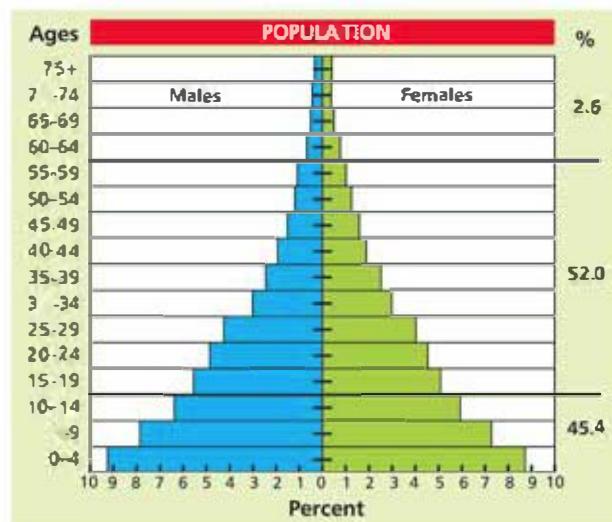
## General Information

Capital city	Honiara
Number of islands	992
Land area	28 370 sq km
Languages	Melanesian pidgin, English, 120 indigenous languages
People	Melanesian (95%), Polynesian (4%), Asian and Micronesian (1%)
Gross domestic product (GDP) per capita (2002)	\$494
Economy	Timber, fish, palm oil
Total population by census (1999)	409 042
Population estimated (2004)	460 100
Population density (people/km <sup>2</sup> )	16
Infant mortality rate (per 1000 live births) (1999)	66
Maternal mortality rate (per 100 000 live births) (2003)	295
Life expectancy at birth (1999)	61.1
Leading causes of mortality (1999)	Neoplasms, neonatal causes, malaria, cardiovascular diseases (CVA as the leading cause), respiratory diseases (pneumonia as the leading cause)

Source: Country Health Information Profile 2004 (WHO Regional Office for the Western Pacific), Secretariat of the Pacific Community (SPC), Lonely Planet Destinations



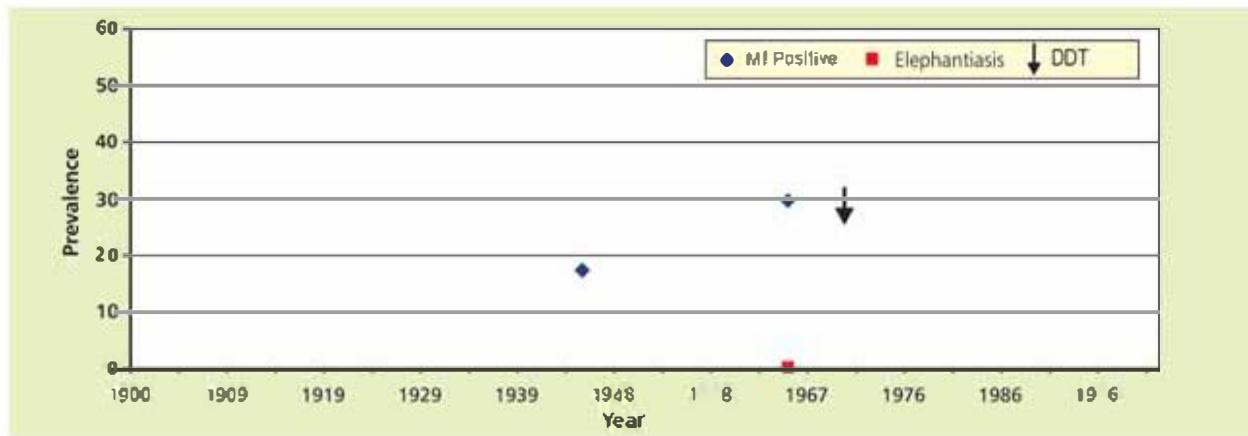
Source: WorldClimate  
Temperature: Honiara 1951 and 1990.  
Rainfall: Honiara 1951 and 1990



Source: Secretariat of the Pacific Community, 2000



### 3 Filariasis before PacELF, 1900–1996



#### Country Filariasis Activities in the 1900s before PacELF

##### Microfilaria Prevalence and Clinical Surveys

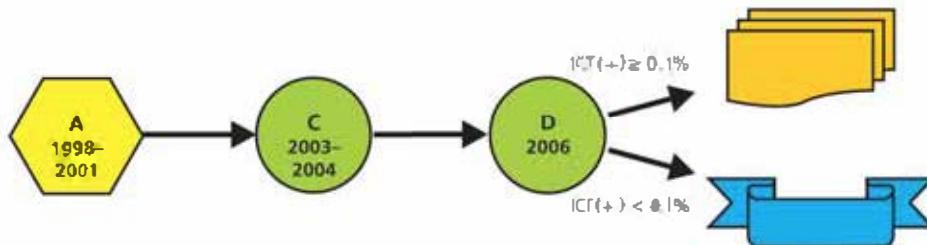
Population/Area	Date	% Mf pos (n)	Noted Clinical Features % (n)	Primary Reference
Guadalcanal	1945	10.2 (157)		Schlosser RJ (1945)
Malaita	1945	9.6 (584)		Schlosser RJ (1945)
San Cristobal	1945	31.5 (558)		Schlosser RJ (1945)
Guadalcanal- Coastal	1965	28.5 (245)	Elephantiasis: 0.8 (245)	Mataika JU (1965)
Guadalcanal- Bush	1965	25.0 (88)	Elephantiasis: 0.0 (88)	Mataika JU (1965)
Rennel and Bellona, Tenaru	1965	1.3 (77)	Elephantiasis: 0.0 (245)	Mataika JU (1965)
Florida Island	1965	40.2 (266)	Elephantiasis: 3.0 (266)	Mataika JU (1965)

##### Mass Drug Administration or Other Control Measures

Population/Area	Date	Activity	Details	Primary Reference
Nationwide	1970s	Vector control	Large malaria eradication vector control spray programme	Webber RH (1975)

### 4 PacELF Activity

#### PacELF Country Plan



Type	Year	Sampling	Target	Result
A	1998–2001	Cluster	Nationwide	ICT 0% (0/4035)
C	2003–2004	LQAS	Nationwide	ICT 0.3% (30/11364)
D	2006	Complete	14 400 all 5- to 6-year-old children	



## Results of Blood Surveys and MDAs under PacELF

### Blood Surveys

Date	Method	Target	Sampling	No. examined	No. of positives	Positive rate (%)	Remarks	Reference
1998-2001	ICT	Whole area (19 villages)	Stratification and EPI type cluster sampling	4035	0	0		Presentation in AM3
2003	ICT	Whole area (10 provinces)	LQAS sampling	11 364	30	0.3		Gov. Annual Report 2003-2004

### Supplies Shipped from PacELF, 2000-2004

Year	2000	2001	2002	2003	2004
ALB (tablets)	-	-	-	-	-
DEC (tablets)	-	-	-	2 400 000	-
ICT (test cards)	-	3000	-	15 000	6000

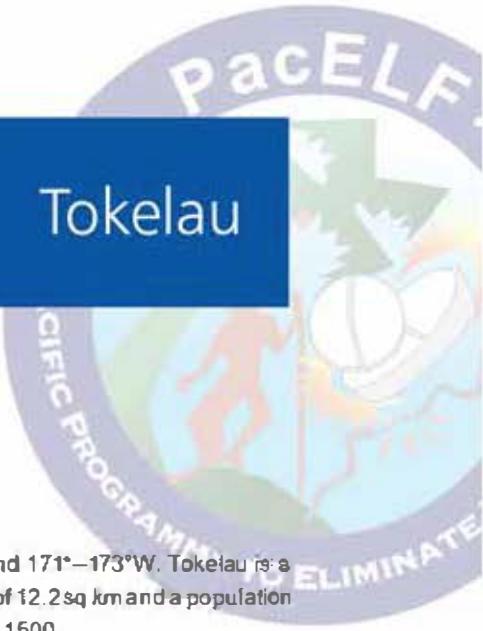
Partnership: WHO, JICA (DEC and ICT)

**Operational Staff:** Vector Borne Disease Control, SIMTRI





## Tokelau



### 1 Summary

Tokelau consists of three atolls located between 8°–10°S and 171°–173°W. Tokelau is a non-self-governing territory under New Zealand. It has a land area of 12.2 sq km and a population of 1537 (2001 census). In 2004 the population was estimated at 1500.

In the early 1900s, surveys of the three atolls revealed that filariasis was endemic, with rates of 18.8% for the whole population and 22.2% for males over the age of 20. However, no cases of elephantiasis were found (O'Connor 1923 and Buxton 1928). In 1955, the Mf rate remained high, at 25.8% for adults (Laird 1955).

All atolls were endemic according to a survey in 1959 (Laird and Colles 1959, quoted in Iyengar 1965). The Mf prevalence rates were 28.1% among 32 males and 12.5% among 40 females in Nukunonu, 46.9% among 32 males and 14.3% among 42 females in Fakaofo, and 38.9% among 36 males and 18.2% among 44 females in Atafu.

A nationwide prevalence survey of 1243 people in 1994 found only one positive case (a Samoan immigrant), in Fakaofo. A nationwide MDA was implemented in 1994.

In 1999, Tokelau joined PacELF and a baseline antigen prevalence survey of all inhabitants was conducted (Ministry of Health). Of 1311 people in all atolls examined, only one positive case was found, in Nukunonu; a female Tuvaluan immigrant. Tokelau was classified as a non-endemic country according to this survey result. Additional filariasis activities have not been undertaken.

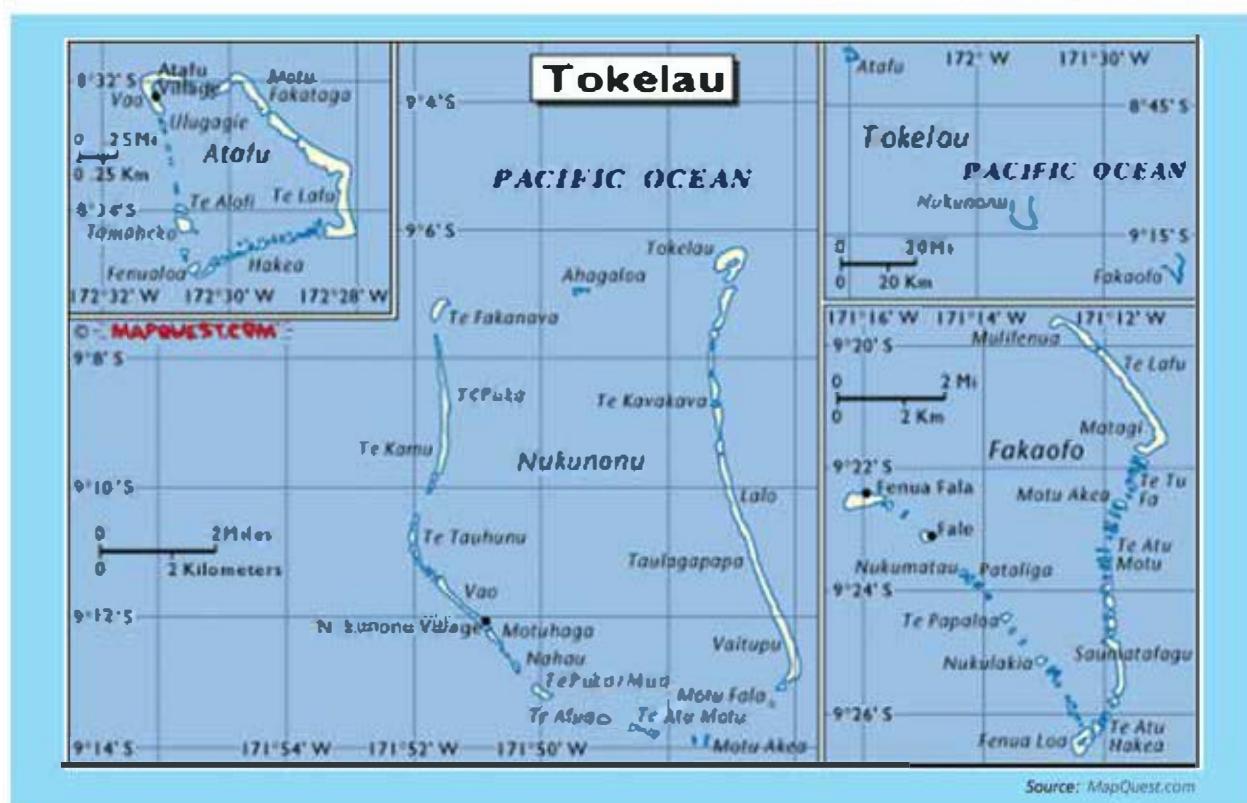


## 2 Country Profile

### Filariasis Type and Vectors

<b>Filariasis latest status</b>	Non-endemic
<b>Filaria type</b>	<i>Wuchereria bancrofti</i>
<b>Mosquito vectors</b>	<i>Aedes polynesiensis</i>

Source: Culicidae of the Australasian Region, Volume 12, 1989



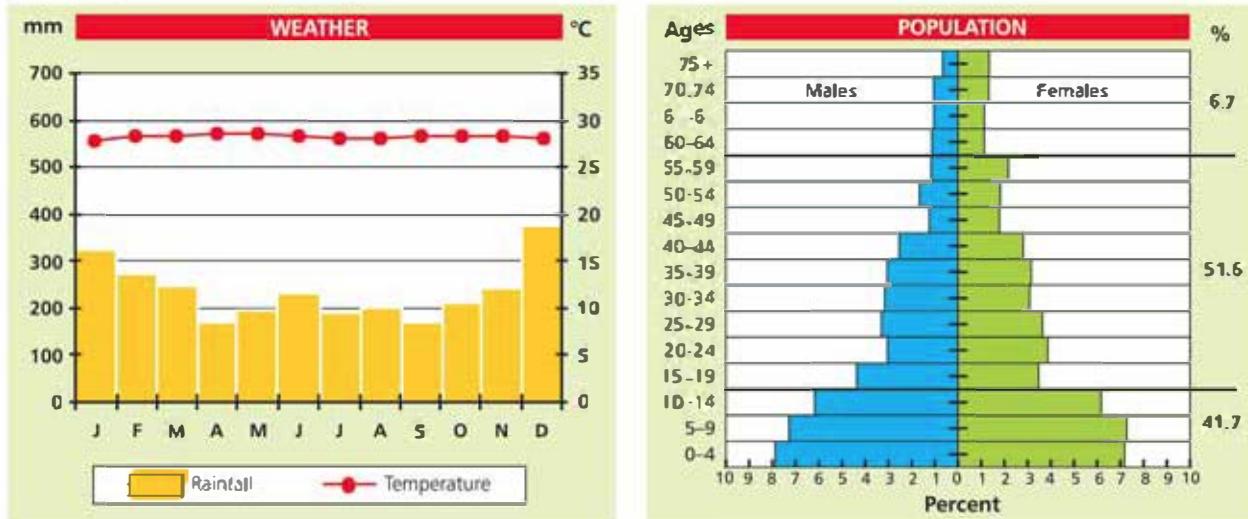
Source: MapQuest.com

### General Information

<b>Capital city</b>	Nukunonu
<b>Number of islands</b>	3 atolls
<b>Land area</b>	12 sq km
<b>Languages</b>	Tokelauan, English
<b>People</b>	Polynesian
<b>Gross domestic product (GDP) per capita (2003)</b>	\$612
<b>Economy</b>	Philately, copra, handicrafts, fishing licences
<b>Total population by census (2001)</b>	1537
<b>Population estimated (2004)</b>	1500
<b>Population density (people/km<sup>2</sup>)</b>	125
<b>Infant mortality rate (per 1000 live births) (1997–2000)</b>	33
<b>Maternal mortality rate (per 100 000 live births) (2001–2002)</b>	0
<b>Life expectancy at birth (1996)</b>	69.0
<b>Leading causes of mortality (1990–1995)</b>	Diseases of the circulatory system, diseases of the respiratory system, neoplastic diseases, ill-defined and undiagnosed conditions, congenital anomalies

Source: Country Health Information Profile 2004 (WHO Regional Office for the Western Pacific, Secretariat of the Pacific Community (SPC), Lonely Planet Destinations

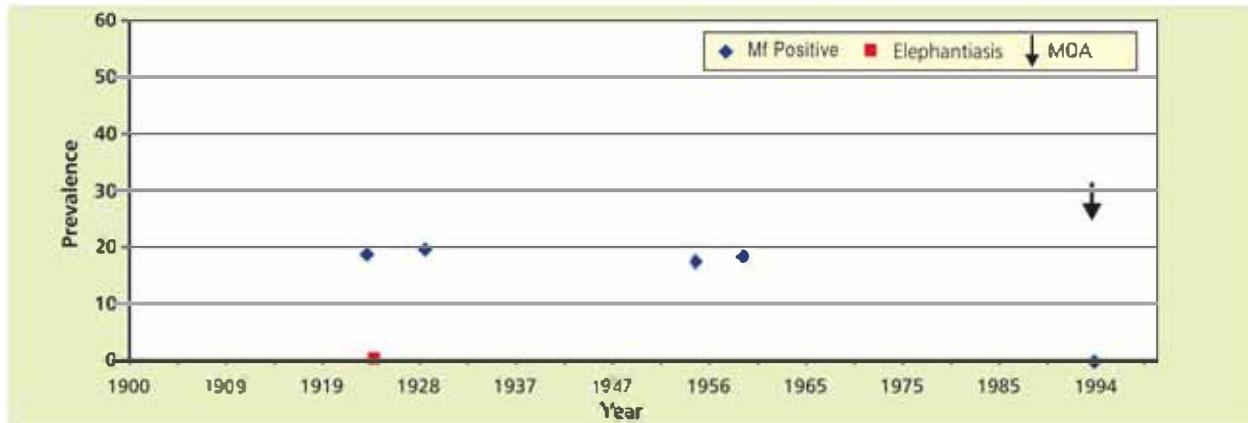
## The PacELF Way Towards the Elimination of Lymphatic Filariasis in the Pacific



Source: World@pacific  
Temperature: Aafuu 1951 to 1989,  
Rainfall: Aafuu 1940 to 1980

Source: Secretariat of the Pacific Community, 2000

### 3 Filariasis before PacELF, 1900–1994



#### Country Filariasis Activities in the 1900s before PacELF

##### Microfilaria Prevalence and Clinical Surveys

Population/Area	Date	% MF pos (n)	Noted Clinical Features % (n)	Primary Reference
3 atolls; 1/3 population	1923	18.8 (320)	Elephantiasis: 0.0 (320)	O'Conner FW (1923)
age < 20; males	1928	5.9 (17)		Buxton PA (1928)
age > 20; males	1928	22.2 (90)		Buxton PA (1928)
age < 20; males	1955	0.0 (31)		Laird M (1955)
age > 20; males	1955	25.8 (66)		Laird M (1955)
age < 10yrs	1959	0.0 (31)		Laird M (1955)
age < 20yrs	1959	4.5 (67)		Laird M (1955)
age > = 20yrs	1959	25.2 (226)		Laird M (1955)
Nationwide	1994	0 (1243)		Country data

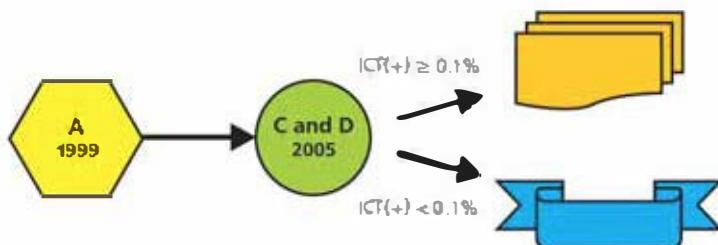
##### Mass Drug Administration or Other Control Measures

Population/Area	Date	Activity	Details	Primary Reference
3 atolls	1994	MDA	3 atolls, DEC(6mg/kg), single dose. 1243 people treated (90%)	Country Report, Department of Health of Western Samoa (1994)



## 4 PacELF Activity

### PacELF Country Plan



Type	Year	Sampling	Target	Result
A	1999	Whole population	All inhabitants	ICT: 0.1% (1/1311) 1 positive non resident.

Source: PacMAN Book 2004

### Results of Blood Surveys and MDAs under PacELF

#### Blood Surveys

Date	Method	Target	Sampling	No. examined	No. of positives	Positive rate (%)	Remarks	Reference
1999	ICT	Whole area	All inhabitants	1311	1	0.1	↑ positive is non-resident	MOH Report 1999

#### Supplies Shipped from PacELF, 2000–2004

Year	2000	2001	2002	2003	2004
ALB (tablets)	-	-	-	-	-
DEC (tablets)	-	-	-	-	-
ICT (test cards)	-	-	-	-	-

Partnership: WHO

Operational Staff: Public health nurse





Tonga



## 1 Summary

Tonga consists of 169 islands located between 15°–23°S and 173°–177°W. It has a land area of 747 sq km and a population of 97 784 (1996 census). In 2004 the population was estimated at 98 300 (SPC 2004).

Filariasis has long been noted to be prevalent in Tonga. In 1785, Captain Cook on his voyage in the South Pacific wrote of the common occurrence of enormous swelling of the leg, arm, and scrotum among the natives of Tonga (Iyengar 1965). Elephantiasis was still reported to be common well into the 1900s (Leber and Prowazek 1914, quoted in Sasa 1976). In 1896 Thorpe discovered the absence of nocturnal periodicity of the South Pacific strain of *Wuchereria bancrofti*. He also found the MI prevalence in adults to be 28.8% in Nomuka, 46.9% in Liluka (Ha'apai group), 20% in Vava'u, and 29.2% in Tongatapu. In 1925 the Mf prevalence was 13.5% in Tongatapu, 14.3% in Ha'apai, and 46.2% in Vava'u (Hopkins 1925, quoted in Buxton 1928). In 1957 hospital patients were randomly tested and the Mf rate was 28.2%–48.5% in Vaiola Hospital, Tongatapu, and 49.6% in Ngu Hospital, Vava'u (Iyengar 1965).

Surveys of almost 10 000 people in 1976 found the Mf prevalence to be 17.4%. An MDA was started in May 1977, and the post-treatment survey in 1979 found that the Mf rate had fallen to 1%. A follow-up MDA survey from October 1983 to January 1984 in Ha'apai, Vava'u, 'Eua, Tongatapu, and Niualofutapu found the rate to be 0.4% (unpublished country report).

In 1999 Tonga became a PacELF member. In 1999 to 2000, a baseline survey using ICT antigen tests found an antigenaemia rate of 2.7% among 4002 people examined (2001 country report). Tonga is therefore classified as an endemic country.

Yearly MDAs using DEC (6 mg/kg) and albendazole (400 mg) began in 2001 under PacELF. The first MDA covered 77 595, for a reported coverage of 79.4% (country report 2002). The second MDA in 2002 covered 82 023, for a reported coverage of 83.9% (country presentation at Fourth PacELF Annual Meeting in 2002). The third MDA in 2003 covered 88 752 people (90.8% of the population), and the fourth MDA in 2004 treated 83 719 people (85.6% reported coverage). Random blood surveys in 2003–2004 found 96 antigen-positives out of 3896 on the main island (2.5%) and two positives out of 59 examined in Ha'apai-'Oua (3.4%).

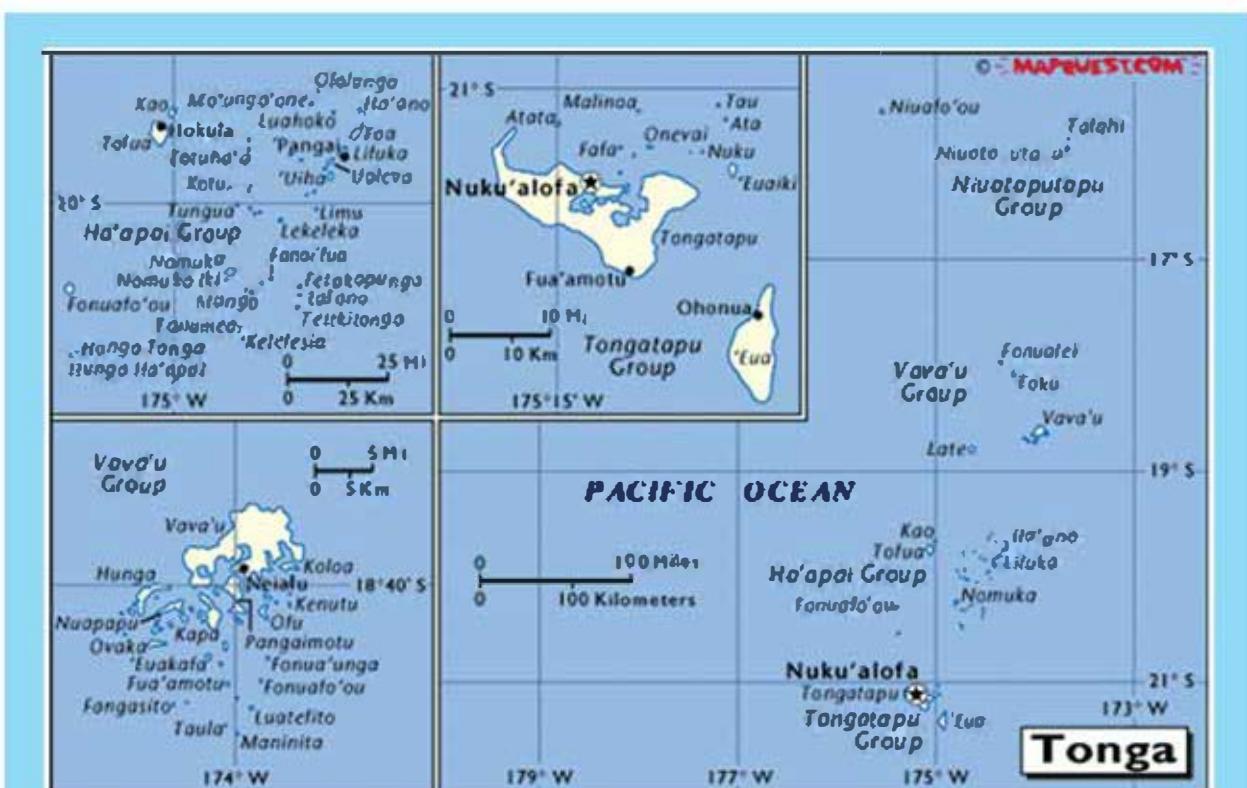


## 2 Country Profile

## Filariasis Type and Vectors

<b>Filarisis latest status</b>	Endemic
<b>Filaria type</b>	<i>Wuchereria bancrofti</i> Diurnally sub-periodic
<b>Mosquito vectors</b>	<i>Aedes tongae</i> <i>Aedes tabu</i> <i>Aedes oceanicus</i>

Source: Culicidae of the Australasian Region, Volume 12, 1989



Source: ManQuest.com

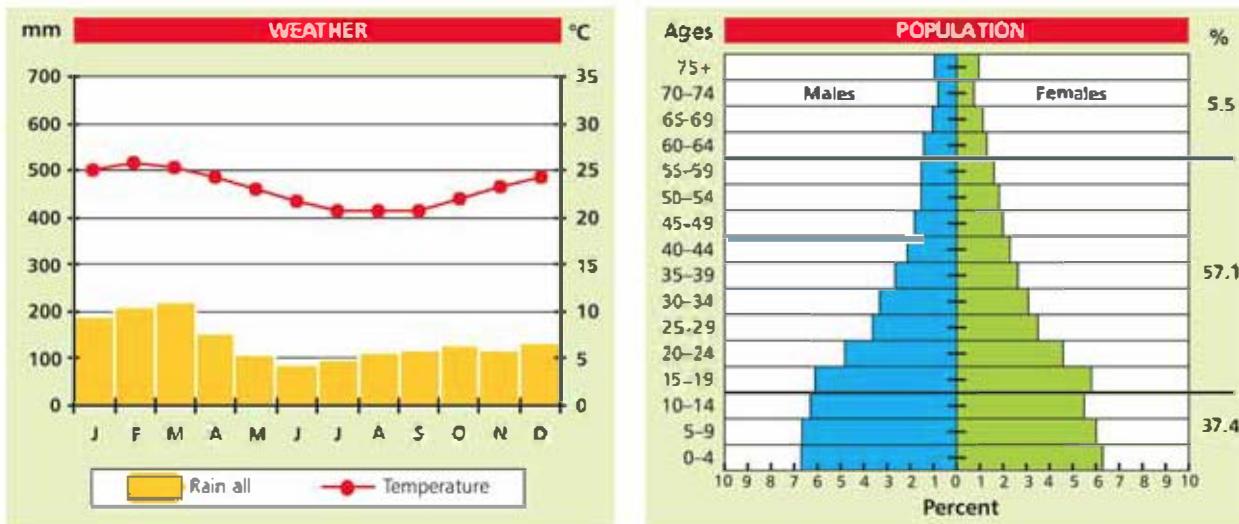


Source: Wikipedia

## General Information

Capital city	Nuku'alofa
Number of islands	171
Land area	649 sq km
Languages	Tongan, English
People	Polyesian
Gross domestic product (GDP) per capita (2002)	\$1337
Economy	Agriculture, fishing, tourism
Total population by census (1996)	97 784
Population estimated (2004)	98 300
Population density (people/km <sup>2</sup> )	151
Infant mortality rate (per 1000 live births) (2002)	9.8
Maternal mortality rate (per 100 000 live births) (2002)	78.2
Life expectancy at birth	71.0
Leading causes of mortality (2002)	Diseases of the circulatory system, neoplasms, symptoms, signs and ill-defined conditions, diseases of the respiratory system, endocrine, nutrition and metabolic conditions

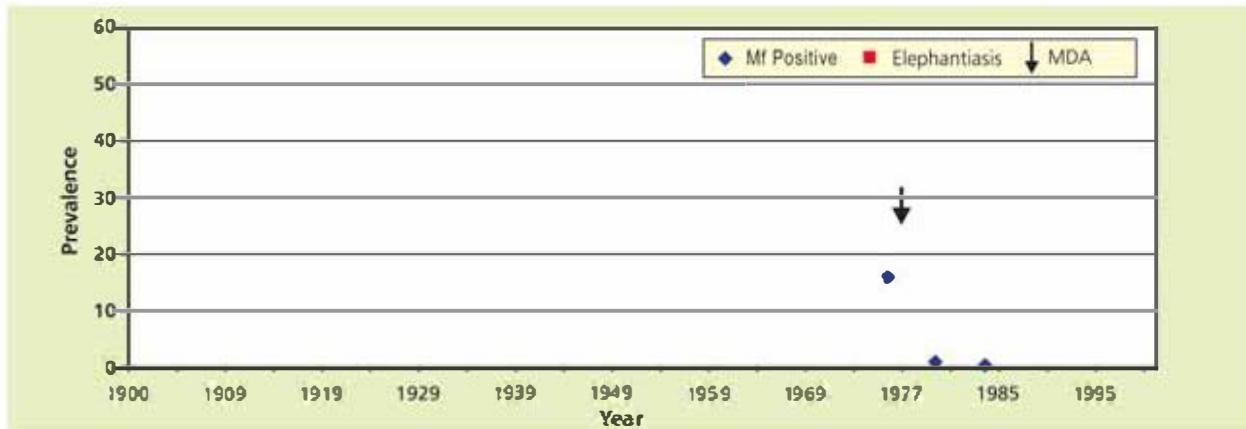
Source: Country Health Information Profile 2004 (WHO Regional Office for the Western Pacific), Secretariat of the Pacific Community (SPC), Lonely Planet Destinations



Source: WorldClimate  
Temperature: Fua'amotu 1981 to 1990  
Rainfall: Nukuhiva 1926 to 1983

Source: Secretariat of the Pacific Community, 2000

### 3 Filariasis before PacELF, 1900–1995



#### Country Filariasis Activities in the 1900s before PacELF

##### Microfilaria Prevalence and Clinical Surveys

Population/Area	Date	% Mf pos (n)	Noted Clinical Features % (n)	Primary Reference
Nationwide	1976	17.4 (9882)		Country Report
	1976	0.1 (899)		Self LS (1977)
Nationwide	1979	1.0 (9676)		Country Report
Ha'apai, Vava'u, Eua, Tongatapu, Niuatoputapu	1983–1984	0.3 (4875)		Country Report

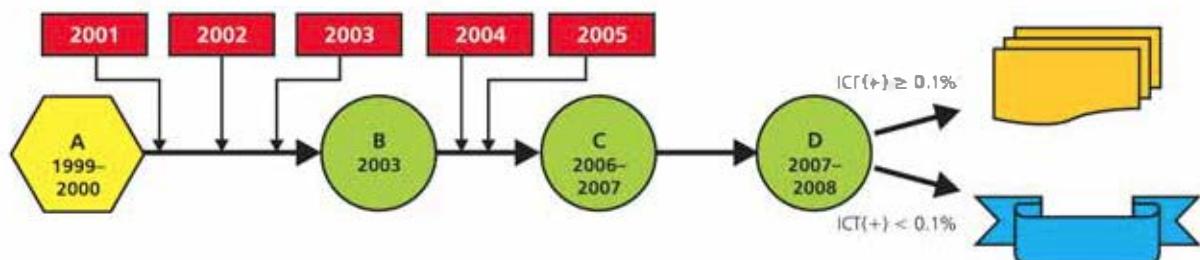
##### Mass Drug Administration or Other Control Measures

Population/Area	Date	Activity	Details	Primary Reference
Nationwide	1977	MDA	12 doses/year	Country data



## 4 PacELF Activity

### PacELF Country Plan



Type	Year	Sampling	Target	Result
A	1999-2000	Convenience	Main island	ICT: 2.7% (108/4002)
B	2003	Cluster	Sentinel sites 3 villages	
C	2006-2007	Cluster	Sentinel sites, Stratified survey by island group	
D	2007-2008	Complete	2500 all 5- to 6-year-children	

Source: PacMAN Book 2004

### Results of Blood Surveys and MDAs under PacELF

#### Blood Surveys

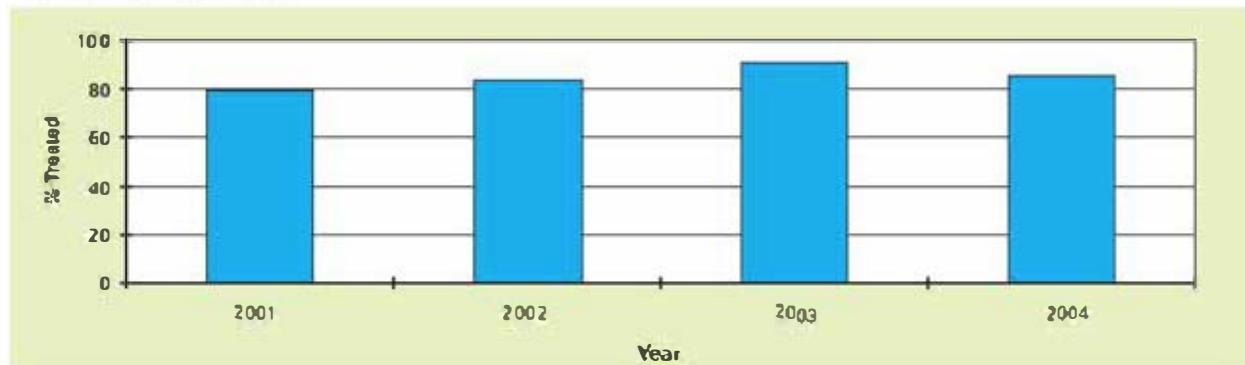
Date	Method	Target	Sampling	No. examined	No. of positives	Positive rate (%)	Remarks	Reference
1999-2000	ICT	Main Island	convenience sample	4002	108	2.7		MDA Report 2001
Dec 03-Aug 04	ICT	Main Island	random sampling	3896	96	2.5	ME	MidTerm Report (Aug 2004)
2004	ICT	Ha'apai -Oua	random sampling	59	2	3.4		Ministry of Health Report (Email 11/03/05)

#### MDAs

Date	MDA	Reported population	Estimated population*	Registered population	% Registered	Treated population	% Treated / Reported	% Treated / Estimated*	% Treated / Registered	Reference
2001	1st	97 784	97 526	83 310	85.2	77 595	79.4	79.6	93.1	Presentation in AM4
2002	2nd	97 784	97 784	90 720	92.8	82 023	83.9	83.9	90.4	Presentation in AM4
2003	3rd	97 784	98 042	93 660	95.8	88 752	90.8	90.5	94.8	Annual Report 2003
2004	4th	97 784	98 300			83 719	85.6	85.2		Annual Report 2004

\*Esimated assuming a constant growth rate between latest census and 2004 population estimate (SDC)

#### MDA Coverage, 2001-2004



**Supplies Shipped from PacELF, 2000–2004**

Year	2000	2001	2002	2003	2004
ALB (tablets)	-	12 600	125 200	100 000	100 000
DEC (tablets)	-	1 600 000	1 000 000	1 000 000	1 000 000
ICT (test cards)	-	2 000	3 000	3 000	2 000

**Partnership:** WHO, GSK (albendazole), JICA (DEC and ICT), JOCV (volunteers)

**Distribution Dose of DEC and Albendazole Tablets**

Age	No. of DEC (50 mg) tablets	No. of albendazole (400 mg) tablets
3–7	1	1
8–10	2	1
11–15	4	1
16–20	6	1
21–50	8	1
51–80	9	1

**Registration Form**

Kolomotu's Cluster  
■ Longolongo

Pac-ELF TONGA Registration Form 2004

REF	NAME	SEX	AGE	DISTRICT	SUB DISTRICT	VILLAGE 1	VILLAGE 2	DISTANCE	QUANTITY	DOSAGE	If not taken orally, check one reason				Frequency of intake
											ALB	DEC	ALB	DEC	
001	Sam	M	10	Kolomotu	Kolomotu			500m	1	100	1	0	0	0	0
002	Sam	M	10	Kolomotu	Kolomotu			500m	1	100	1	0	0	0	0
003	Sam	M	10	Kolomotu	Kolomotu			500m	1	100	1	0	0	0	0
004	Sam	M	10	Kolomotu	Kolomotu			500m	1	100	1	0	0	0	0
005	Sam	M	10	Kolomotu	Kolomotu			500m	1	100	1	0	0	0	0
006	Sam	M	10	Kolomotu	Kolomotu			500m	1	100	1	0	0	0	0
007	Sam	M	10	Kolomotu	Kolomotu			500m	1	100	1	0	0	0	0
008	Sam	M	10	Kolomotu	Kolomotu			500m	1	100	1	0	0	0	0
009	Sam	M	10	Kolomotu	Kolomotu			500m	1	100	1	0	0	0	0
010	Sam	M	10	Kolomotu	Kolomotu			500m	1	100	1	0	0	0	0
011	Sam	M	10	Kolomotu	Kolomotu			500m	1	100	1	0	0	0	0
012	Sam	M	10	Kolomotu	Kolomotu			500m	1	100	1	0	0	0	0
013	Sam	M	10	Kolomotu	Kolomotu			500m	1	100	1	0	0	0	0
014	Sam	M	10	Kolomotu	Kolomotu			500m	1	100	1	0	0	0	0
015	Sam	M	10	Kolomotu	Kolomotu			500m	1	100	1	0	0	0	0
016	Sam	M	10	Kolomotu	Kolomotu			500m	1	100	1	0	0	0	0
017	Sam	M	10	Kolomotu	Kolomotu			500m	1	100	1	0	0	0	0
018	Sam	M	10	Kolomotu	Kolomotu			500m	1	100	1	0	0	0	0
019	Sam	M	10	Kolomotu	Kolomotu			500m	1	100	1	0	0	0	0
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022	Sam	M	10	Kolomotu	Kolomotu			500m	1	100	1	0	0	0	0
023	Sam	M	10	Kolomotu	Kolomotu			500m	1	100	1	0	0	0	0
024	Sam	M	10	Kolomotu	Kolomotu			500m	1	100	1	0	0	0	0
025	Sam	M	10	Kolomotu	Kolomotu			500m	1	100	1	0	0	0	0
026	Sam	M	10	Kolomotu	Kolomotu			500m	1	100	1	0	0	0	0
027	Sam	M	10	Kolomotu	Kolomotu			500m	1	100	1	0	0	0	0
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037	Sam	M	10	Kolomotu	Kolomotu			500m	1	100	1	0	0	0	0
038	Sam	M	10	Kolomotu	Kolomotu			500m	1	100	1	0	0	0	0
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072	Sam	M	10	Kolomotu	Kolomotu			500m	1	100	1	0	0	0	0
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082	Sam	M	10	Kolomotu	Kolomotu			500m	1	100	1	0	0	0	0
083	Sam	M	10	Kolomotu	Kolomotu			500m	1	100	1	0	0	0	0
084	Sam	M	10	Kolomotu	Kolomotu			500m	1	100	1	0	0	0	0
085	Sam	M	10	Kolomotu	Kolomotu			500m	1	100	1	0	0	0	0
086	Sam	M	10	Kolomotu	Kolomotu			500m	1	100	1	0	0	0	0
087	Sam	M	10	Kolomotu	Kolomotu			500m	1	100	1	0	0	0	0
088	Sam	M	10	Kolomotu	Kolomotu			500m	1	100	1	0	0	0	0
089	Sam	M	10	Kolomotu	Kolomotu			500m	1	100	1	0	0	0	0
090	Sam	M	10	Kolomotu	Kolomotu			500m	1	100	1	0	0	0	0
091	Sam	M	10	Kolomotu											



**Operational Staff:** Public health staff





## Tuvalu

### 1 Summary

Tuvalu consists of nine atolls situated between 5°–10°S and 176°–179°E. It has a land area of 25.9 sq km. Its population was 9043 at the 1991 census and 9561 at the 2002 census. In 2004, the population was estimated at 9600 (SPC 2004).

Surveys carried out in Tuvalu in 1919 and the 1920s showed Mf prevalence to be very high (38%–46%) and elephantiasis and hydrocoele common (McNaughton 1919, O'Connor 1923, Buxton 1928). Mf rates remained high until the 1940s (Venner 1944, Lewis 1945, quoted in Sasa 1976) and 1960s (annual report of Medical Department, quoted in Sasa 1976). The Mf prevalence in 1971 was reportedly 14.7% (unpublished country data). The following year, an MDA using DEC was carried out. The post-treatment survey in 1973 found the Mf prevalence to be just below 1% (First PacELF Annual Meeting in 1999). An MDA using DEC was implemented in 1992–1993.

In 1999, Tuvalu joined PacELF and a baseline blood survey using ICT antigen tests was conducted in Funafuti; 22.3% of the 574 people tested were positive. Tuvalu is therefore classified as an endemic country.

Annual MDAs using DEC (6 mg/kg) and albendazole (400 mg) began in 2001 under PacELF. The first MDA covered 6742 people, for a reported coverage of 81.2% (country annual report). The second MDA in 2002 covered 4467 people, for a reported coverage of 46.7% (country presentation at fifth PacELF annual meeting in 2003). During the second MDA in 2002, a blood survey in Funafuti found 70 positive cases out of 318 people examined (22.0%) (country presentation at Fifth PacELF Annual Meeting in 2003). The third MDA in 2003 treated 7896 people (82.6% coverage) and a blood survey that year found 114 positives in 652 people tested (17.5%) (2003 annual report). In 2004, the fourth MDA treated 8000 people (83.7% coverage). A blood survey of the whole population in 2004 found that 973 of 8173 people tested were positive (11.9%).



## 2 Country Profile

### Filariasis Type and Vectors

Filariasis latest status	Endemic
Filaria type	<i>Wuchereria bancrofti</i> Diurnally sub-periodic
Mosquito vectors	<i>Aedes polynesiensis</i>

Source: Culicidae of the Australasian Region, Volume 12, 1989



Source: MapQuest.com

### Coat of Arms



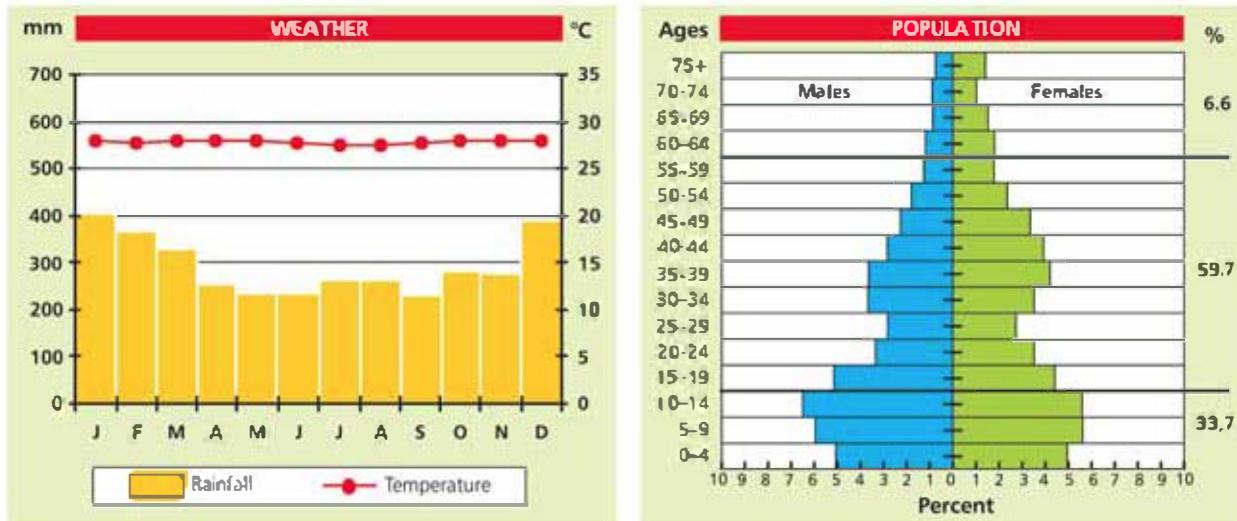
Source: Wikipedia



## General Information

Capital city	Funafuti
Number of islands	9
Land area	26 sq km
Languages	Tuvaluan, English
People	Polynesian (96%), Micronesian (4%)
Gross domestic product (GDP) per capita (2000)	\$1475
Economy	Textiles, soap, philately, copra
Total population by census (1991)	9043
Population estimated (2004)	9600
Population density (people/km <sup>2</sup> )	369
Infant mortality rate (per 1000 live births) (2002)	19.2
Maternal mortality rate (per 100 000 live births) (2002)	Not available
Life expectancy at birth (2002)	65.0
Leading causes of mortality (2002)	Heart problem, senility, undiagnosed, hypertension, CVA (stroke)

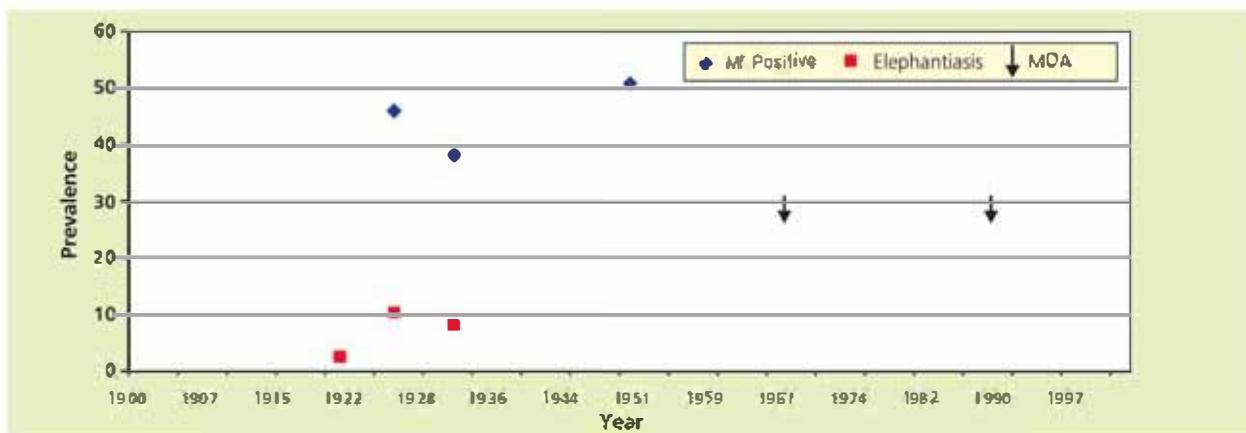
Source: Country Health Information Profile 2004 (WHO Regional Office for the Western Pacific), Secretariat of the Pacific Community (SPC), Lonely Planet Destinations



Source: WorldClimate.  
Temperature: Funafuti 1932 and 1990,  
Rainfall: Funafuti 1927 and 1990

Source: Secretariat of the Pacific Community, 2000

### 3 Filariasis before PacELF, 1900–1998



#### Country Filariasis Activities in the 1900s before PacELF

##### Microfilaria Prevalence and Clinical Surveys

Population/Area	Date	% Mf pos (n)	Noted Clinical Features % (n)	Primary Reference
Nationwide	1919	-	Elephantiasis: 2.6 (3434)	McNaughton JG (1919)
Nationwide	1923	46.0 (1169)	Elephantiasis: 10.3 (1169)	O'Conner FW (1923)
	1928	38.1 (333)	Elephantiasis: 8.1 (333), Hydrocele: 23 (333)	Buxton PA (1927, '28)
Nanumea	1944	50.8 (65)	-	Venner RB (1944)

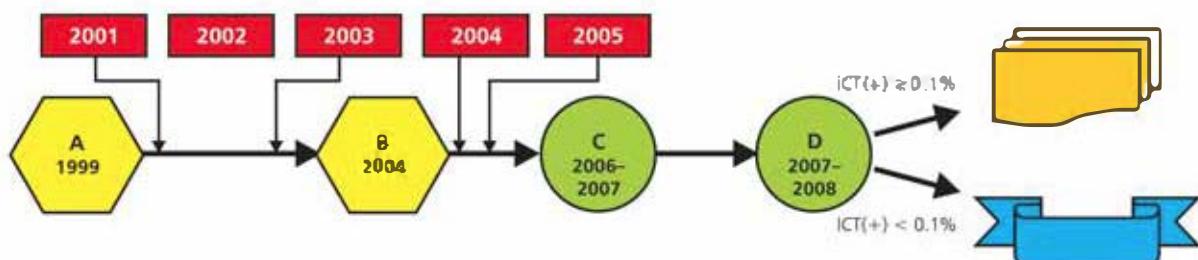
##### Mass Drug Administration or Other Control Measures

Population/Area	Date	Activity	Details	Primary Reference
Nationwide	1972	MDA	DEC	WHO/SPC (1974)
	1992-1993	MDA	DEC	Country data



## 4 PacELF Activity

### PacELF Country Plan



Type	Year	Sampling	Target	Result
A	1999	Convenience	School children, Funafuti	ICT: 22.3% (128/574)
B	2003-2004	Cluster	Sentinel sites school children	
C	2006-2007	Cluster	Stratified survey Nationwide	
D	2007-2008	LQAS	230 all 5- to 6-year-old children	

Source: PacMAN Book 2004



### Results of Blood Surveys and MDAs under PacELF

#### Blood Surveys

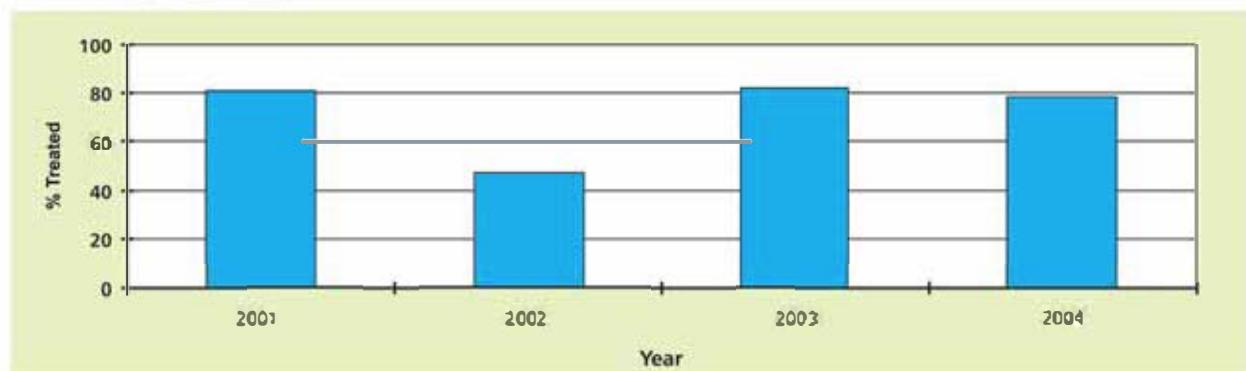
Date	Method	Target	Sampling	No. examined	No. of positives	Positive rate (%)	Remarks	Reference
1999	ICT	Funafuti	convenience sample	574	128	22.3		Ministry of Health Annual Report 2001
July Dec/2002	ICT	Funafuti	convenience sample	318	70	22.0		Presentation in AMS
2003	ICT	Nukulaelae, Funafuti, Vaitupu, Nui	convenience sample	652	114	17.5		Annual report 2003
2004	ICT	Whole area	convenience sample	8173	990	12.1	ME	Mid Term Report (08/04/05)

#### MDAs

Date	MDA	Reported population	Estimated population*	Registered population	% Registered	Treated population	% Treated / Reported	% Treated / Estimated*	% Treated / Registered	Reference
2001	1st	8307	9542	7175	86.4	6742	81.2	70.7	94.0	Ministry of Health Annual Report 2001
2002	2nd	9561	9561	4738	49.6	4467	46.7	46.7	94.3	Presentation in AMS
2003	3rd	9561	9581	8360	87.4	7896	82.6	82.4	94.4	Annual Report 2003
2004	4th	9561	9600	7738	80.9	7509	78.5	78.2	97.0	MDA 2004 Report

\*Estimated assuming constant growth rate between latest census and 2004 population estimate (SPO)



**MOA Coverage, 2001–2004****Supplies Shipped from PacELF, 2000-2004**

Year	2000	2001	2002	2003	2004
ALB (tablets)	-	13 000	10 400	6000	9000
DEC (tablets)	-	84 000	90 000	90 000	100 000
ICT (test cards)	-	2000	2000	2000	10 000

Partnership: WHO, GSK (Albendazole), JICA (DEC, ICT)

**Distribution Dose of DEC and Albendazole Tablets**

Age	No. of DEC (50 mg) tablets	No. of albendazole (400 mg) tablets
2-5	2	1
6-10	3	1
11-15	5	1
16-20	7	1
21-50	9	1
50+	8	1

**Registration Form**

<b>REGISTRATION BOOKLET</b>  <b>TUvalu NATIONAL FILARIasis PROGRAMME</b>    <b>MASS DRUG ADMINISTRATION (MDA)</b> SEPTEMBER 2004  Please return to Tuvalu Ministry of Health Health Sector	Tuvalu National Filariasis Program Island: _____ MDA OFFICER: _____ <table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th>Inc.</th> <th>Name</th> <th>Sex Male/Female</th> <th>Age Group (Years)</th> <th>Treatment</th> <th>No Treatment</th> </tr> <tr> <th></th> <th></th> <th>Sex</th> <th>2-5   6-10   11-15   16-20   21-40   50+  </th> <th>DEC   Alb</th> <th>Hours   VO   VS   PW   AW   R   Comment</th> </tr> </thead> <tbody> <tr><td>1</td><td></td><td></td><td></td><td></td><td></td></tr> <tr><td>2</td><td></td><td></td><td></td><td></td><td></td></tr> <tr><td>3</td><td></td><td></td><td></td><td></td><td></td></tr> <tr><td>4</td><td></td><td></td><td></td><td></td><td></td></tr> <tr><td>5</td><td></td><td></td><td></td><td></td><td></td></tr> <tr><td>6</td><td></td><td></td><td></td><td></td><td></td></tr> <tr><td>7</td><td></td><td></td><td></td><td></td><td></td></tr> <tr><td>8</td><td></td><td></td><td></td><td></td><td></td></tr> <tr><td>9</td><td></td><td></td><td></td><td></td><td></td></tr> <tr><td>10</td><td></td><td></td><td></td><td></td><td></td></tr> <tr><td>11</td><td></td><td></td><td></td><td></td><td></td></tr> <tr><td>12</td><td></td><td></td><td></td><td></td><td></td></tr> <tr><td>13</td><td></td><td></td><td></td><td></td><td></td></tr> <tr><td>14</td><td></td><td></td><td></td><td></td><td></td></tr> <tr><td>15</td><td></td><td></td><td></td><td></td><td></td></tr> <tr><td>16</td><td></td><td></td><td></td><td></td><td></td></tr> <tr><td>17</td><td></td><td></td><td></td><td></td><td></td></tr> <tr><td>18</td><td></td><td></td><td></td><td></td><td></td></tr> <tr><td>19</td><td></td><td></td><td></td><td></td><td></td></tr> <tr><td>20</td><td></td><td></td><td></td><td></td><td></td></tr> <tr><td>21</td><td></td><td></td><td></td><td></td><td></td></tr> <tr><td>22</td><td></td><td></td><td></td><td></td><td></td></tr> <tr><td>23</td><td></td><td></td><td></td><td></td><td></td></tr> <tr><td>24</td><td></td><td></td><td></td><td></td><td></td></tr> <tr><td>25</td><td></td><td></td><td></td><td></td><td></td></tr> <tr><td>26</td><td></td><td></td><td></td><td></td><td></td></tr> <tr><td>Total:</td><td></td><td></td><td></td><td></td><td></td></tr> </tbody> </table> Key: < 2 yrs = less than 2 years VO = Voice VS = Vision PW = Pulse AW = Abdominal R = Respiratory Comment: _____	Inc.	Name	Sex Male/Female	Age Group (Years)	Treatment	No Treatment			Sex	2-5   6-10   11-15   16-20   21-40   50+	DEC   Alb	Hours   VO   VS   PW   AW   R   Comment	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						Total:					
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**Operational Staff:** Public health doctor and nurse





# Vanuatu



## 1 Summary

Vanuatu consists of 80 islands located between 12°–21°S and 166°–171°E. It has a land area of 12 195 sq km and a population of 186 678 (1999 census). In 2004 the population was estimated at 215 800 (SPC 2004).

The first survey of Mf prevalence found the rate to be 31.4%; elephantiasis had a prevalence of 6% and hydrocoele, 7.2% (Buxton 1927). There were no other studies after that until 1997–1998, when a baseline filariasis prevalence survey was conducted nationwide. The Mf prevalence was 2.5% among 4269 people examined and the ICT antigen-positive rate was 4.8% among 4362 people examined (screening survey data book 1998).

In 1999 Vanuatu joined PacELF as an endemic country. Yearly MDAs using DEC (6 mg/kg) and albendazole (400 mg) began in 2000 under PacELF. The first MDA covered 154 739 people, for a reported coverage of 82.9% (country report 2000). The second MDA in 2001 covered 156 368 people, for a reported coverage of 83.8% (country report 2001). A mid-term survey in selected sites in 2002 found an Mf prevalence rate of 1.2% and an antigen-positive rate of 8.0% among 1940 people surveyed (report on the MDA evaluation). The third MDA in 2002 covered 156 350 (83.8% coverage) (correspondence with Mr Tsukiji 2003). The fourth MDA in 2003 covered 163 271 people, for a coverage of 87.46%. An antigen prevalence survey of 629 people in 2003 found 52 to be positive (8.3%), and a spot-check survey in North Ambrym in 2004 found 19.7% positive (106 out of 538 tested). The fifth MDA in 2004 treated 158 758 people (85% coverage).

## 2 Country Profile

### Filariasis Type and Vectors

Filariasis latest status	Endemic
Filaria type	<i>Wuchereria bancrofti</i> Nocturnally periodic
Mosquito vectors	<i>Anopheles farauti</i>

Source: Culicidae of the Australasian Region, Volume 12, 1989



Source: MapQuest.com

### Coat of Arms

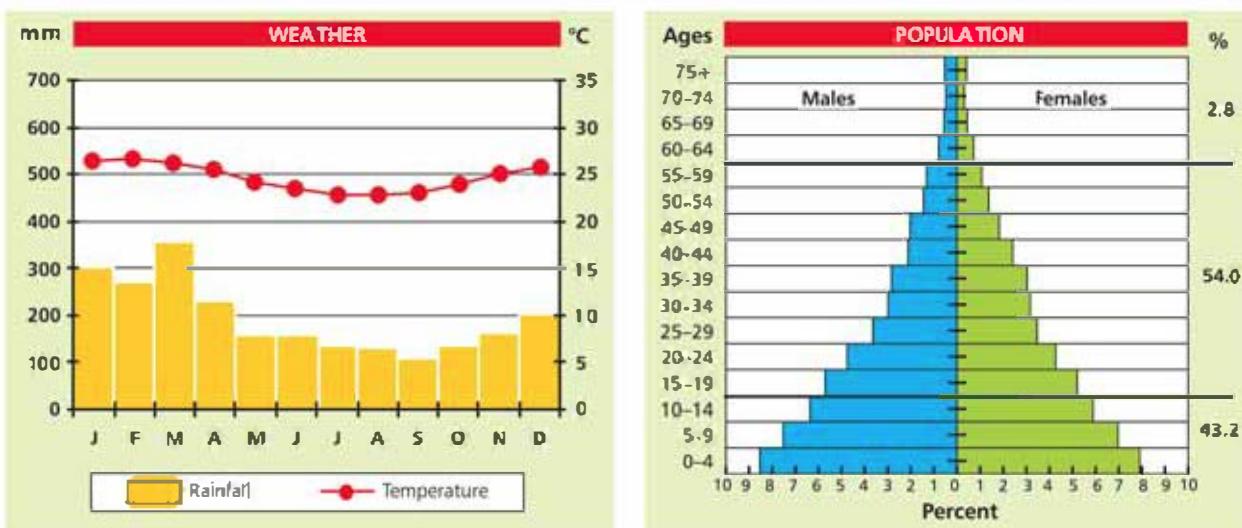


Source: Wikipedia

## General Information

Capital city	Port Vila
Number of islands	80
Land area	12 190 sq km
Languages	Bislama, English, French
People	Melanesian and Polynesian (94%), French (4%), Chinese, Pacific Islanders
Gross domestic product (GDP) per capita	\$1400
Economy	Agriculture (copra, timber, beef, cocoa, coffee), tourism
Total population by census (1999)	186 678
Population estimated (2004)	215 800
Population density (people/km <sup>2</sup> )	18
Infant mortality rate (per 1000 live births) (1999)	27
Maternal mortality rate (per 100 000 live births) (1993)	68
Life expectancy at birth (2003)	68.3
Leading causes of mortality (2003)	Asthma, stroke, heart failure, diabetes mellitus, malaria

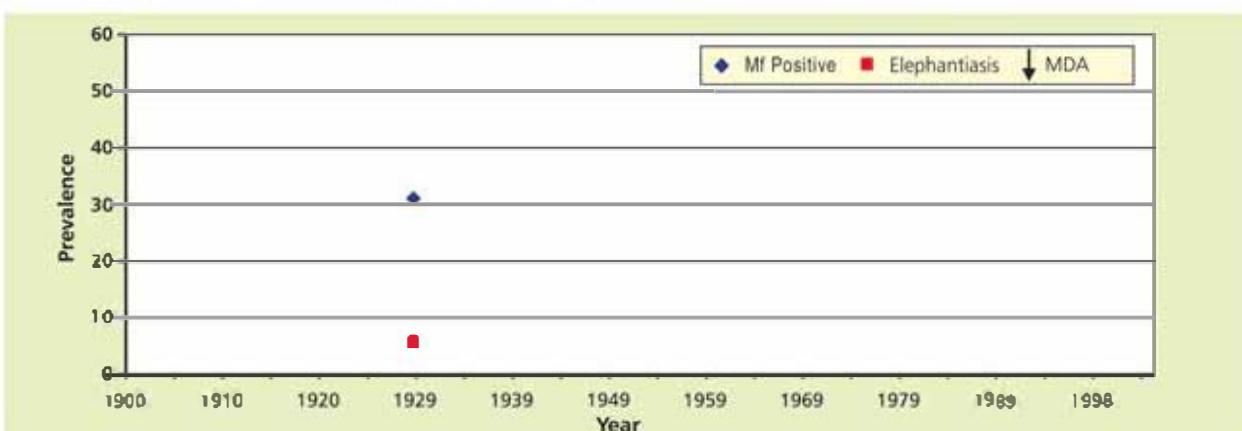
Source: Country Health Information Profile 2004 (WHO Regional Office for the Western Pacific), Secretariat of the Pacific Community (SPC), Lonely Planet Destinations



Source: World Bank,  
Temperature: Port Vila 1948 to 1985  
Rainfall: Port Vila 1928 and 1985

Source: Secretariat of the Pacific Community, 2000

## 3 Filariasis before PacELF, 1900–1998



## Country Filariasis Activities in the 1900s before PacELF

### Microfilaria Prevalence and Clinical Surveys

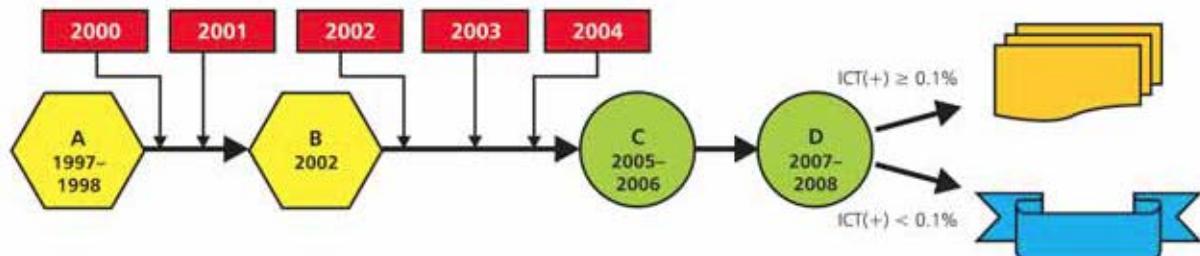
Population/Area	Date	%MF pos (n)	Noted Clinical Features % (n)	Primary Reference
16 Islands	1927	31.4 (318)	Elephantiasis: 6 (318), Hydrocoele: 7.2 (318), Palpable Epitrochlear Glands: 16.7 (318)	Buxton PA, Hopkins GHF (1927)

### Mass Drug Administration or Other Control Measures

Population/Area	Date	Activity	Details	Primary Reference
There are no records of any control programmes in the 1900s				

## 4 PacELF Activity

### PacELF Country Plan



Type	Year	Sampling	Target	Result
A	1997-1998	Convenience	Nationwide	ICT: 4.8% (208/4362)
B	2002	Cluster	Sentinel sites	ICT 8.0% (155/1940); MF 1.2% (23/1940)
C	2005-2006	Cluster	Stratified survey	
D	2007-2008	Complete	8,000 all 5- to 6-year-old children	

Source: PacMAN Book 2004

### Results of Blood Surveys and MDAs under PacELF

#### Blood Surveys

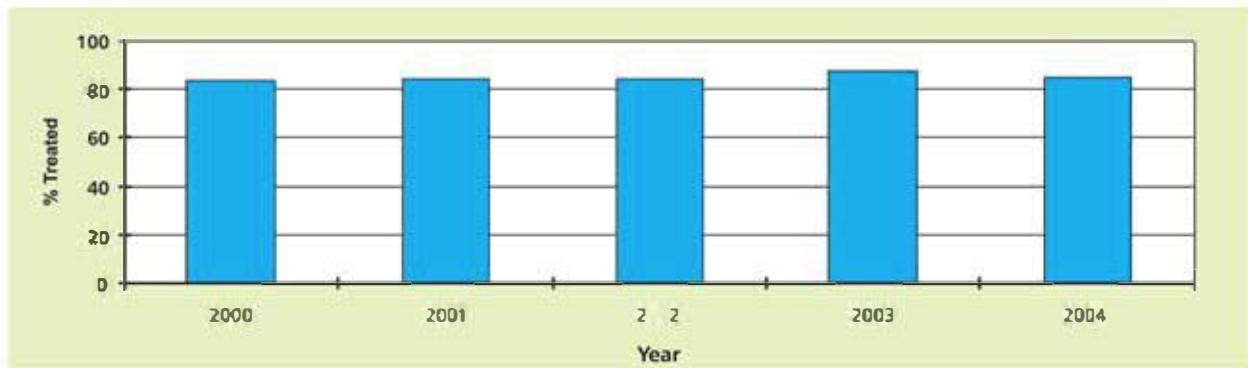
Date	Method	Target	Sampling	No. examined	No. of positives	Positive rate (%)	Remarks	Reference
1997-1998	CT	Whole area (6 provinces)	convenience sample	4362	209	4.8		Screening Survey Data book (97-98)
1997-1998	MF	Whole area (6 provinces)	convenience sample	4269	106	2.5		Screening Survey Data book (97-98)
2002	ICT	Sentinel sites + other areas	convenience sample	1940	155	8.0	ME	Draft report of MDA evaluation 2002
2002	MF	Sentinel sites + other areas	convenience sample	1940	23	1.2		Draft report of MDA evaluation 2002
2003	ICT	Sentinel sites + other areas	convenience sample	629	52	8.3		Presentation in AMS
2004	ICT	Spot check site (Ambrym)	convenience sample	538	106	19.7		Ministry of Health Report (Email 2/02/05)

#### MDAs

Date	MDA	Reported population	Estimated population*	Registered population	% Registered	Treated population	% Treated / Reported	% Treated / Estimated*	% Treated / Registered	Reference
2000	1st	186 678	192 502	196 210	105.1	154 739	82.9	80.4	78.9	2000 MDA Report
2001	2nd	186 678	198 327	188 132	100.8	156 368	83.8	78.8	83.1	2001 MDA Report
2002	3rd	186 678	204 151	183 779	98.5	156 350	83.8	76.6	85.1	Ministry of Health Report (Email 15/05/03)
2003	4th	186 678	209 976	196 400	105.2	163 271	87.5	77.8	83.1	Annual Report 2003
2004	5th	186 678	215 800			158 758	85.0	73.6		Annual Report 2004

\*Estimated occurring constant growth rate between latest census and 2004 population estimate (SPC)



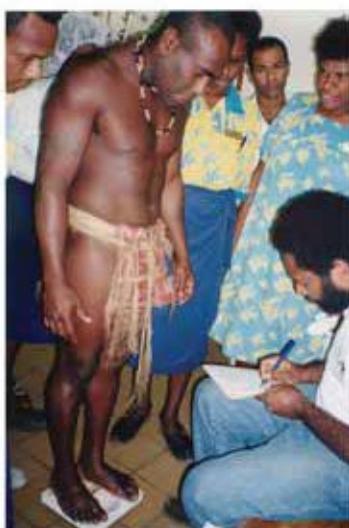
**MDA Coverage, 2000–2004****Supplies Shipped from PacELF, 2000–2004**

Year	2000	2001	2002	2003	2004
ALB (tablets)	-	380 000	239 000	230 000	-
DEC (tablets)	-	2 700 000	1 500 000	1 500 000	500 000
ICT (test cards)	2000	3000	2500	5000	5000

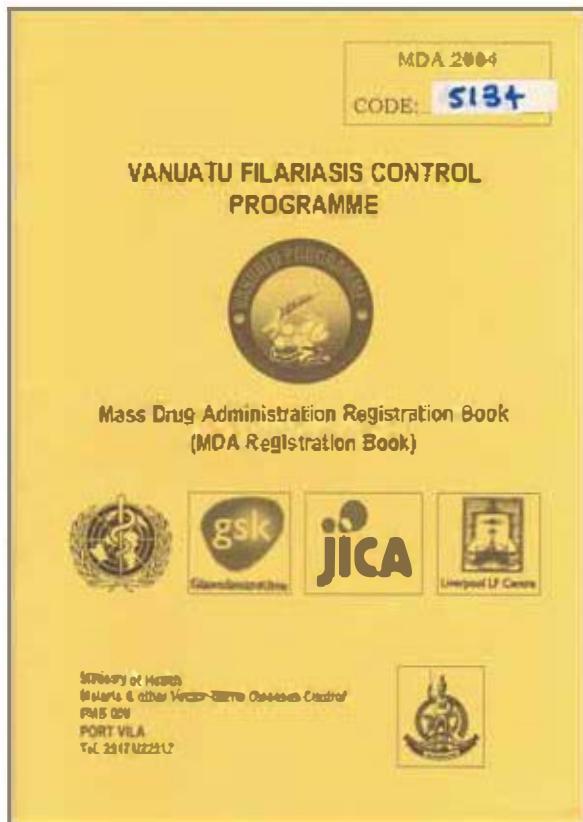
**Partnership:** WHO, GSK (albendazole), Liverpool School for Tropical Medicine, IICA (DEC, ICT), IOC/I (volunteer), VS O (volunteer)

Age	No. of DEC (50 mg) tablets	No. of albendazole (400 mg) tablets
2–9	2	1
10–19	5	1
20–29	7	1
30–39	8	1
40–49	8	1
50–59	8	1
≥ 60	7	1

Weight	No. of DEC (50 mg) tablets	No. of albendazole (400 mg) tablets
8–12	1	1
13–20	2	1
21–29	3	1
30–37	4	1
38–45	5	1
46–54	6	1
55–62	7	1
63–70	8	1
71–79	9	1
>80	10	1



Registration Form



**VANUATU FILARIASIS CONTROL PROGRAMME**  
**Mass Drug Administration Registration Book**

Health Center : \_\_\_\_\_  
(Med Sex)  
Name in Charge : \_\_\_\_\_  
(Name & job title)  
Aid Post & Village : \_\_\_\_\_  
(Aid Post Name & Village name)  
Village : \_\_\_\_\_  
(Village)  
Area : \_\_\_\_\_ Island : \_\_\_\_\_  
(Area)  
(Island)  
Prov/nc : \_\_\_\_\_ Date Complete MDA : \_\_\_\_\_  
(Province)  
(Date of completion MDA)

1. Number of family (Numba blong famili)	2. Total register pop. (Total pop. wei registr.)
3. Total treated population (Total population we i tritin)	
4. Number of tablet (Numba blong imunis wa ya bin givimot.)	1) DEC 2) Albendazole
5a) Total No tritin from Gut bel	
5b) Sik	
5c) Bebe (0-2)	
5d) Ino stap	
5e) Skul	
5f) Travel	
5g) Refuse	
5h) Tritin finis	

\*\* Please submit this Registration Book directly to National Filariasis Control Unit, Ministry of Health, PMB 009, Port Vila or mail to S.C.U.A. in Suva.  
Please do not submit this form to the National Filariasis Control Unit, Ministry of Health, PMB 009, Port Vila and also give to your District Health Office.

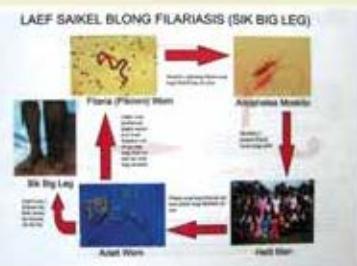
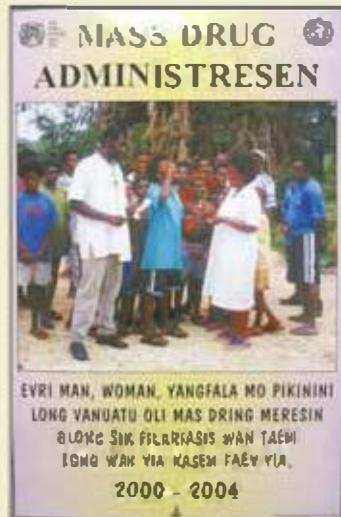
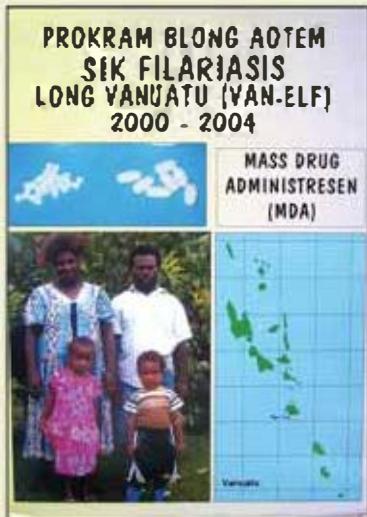
Vilei: \_\_\_\_\_ Nem blong famili : \_\_\_\_\_

↓ Plis tikim yia long age group name.

No.	Name	Sex	Age Group					Tritin	Body weight (kg)	Numba blong tablet	Numba tritin EWOM ?								(f) COMMENT
			M	F	2-9	10-19	20-29				30-39	40-49	50-59	60+	(a) I get sick	(b) Sik	(c) Babek(cz)	(d) Tritin finis	
1																			
2																			
3																			
4																			
5																			
6																			
7																			
8																			
9																			
10																			
11																			
12																			
13																			
14																			
15																			
TOTAL BLONG NAMBA																			

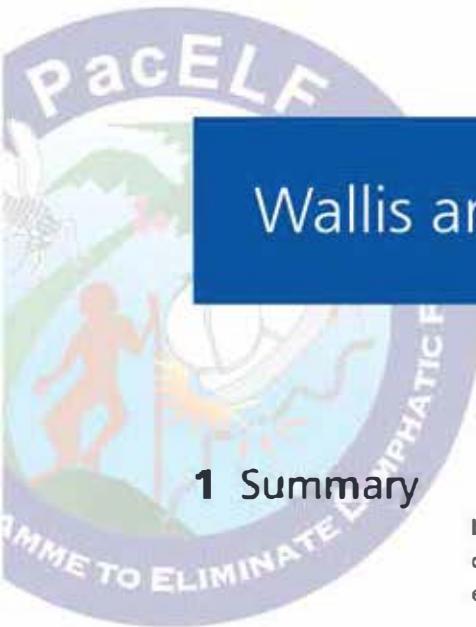


## IEC Materials



**Operational Staff:** Malaria and Vector Borne Disease Unit





# Wallis and Futuna

## 1 Summary

The French overseas territory of Wallis and Futuna is composed of 23 islands located between 14°–16°S and 176°–178°W. It has a land area of 145 sq km, and had a population of 14 166 at the 1996 census and 14 944 at the 2003 census. In 2004, the population was estimated to be 14 900 (SPC 2004).

In the late 1800s, elephantiasis was reported to be common, even among Europeans and in 1909 half of the adult population was said to suffer from elephantiasis (Reynaud 1896, Viala 1909, quoted in Sasa 1976). Wallis was found to have an Mf rate of 40% in 1954 (Touzé 1954) and 20.4% in 1959 (Rageau and Estienne 1959). In 1977 the Mf rate was 21.8% (Bessenay, quoted in Sasa 1976). Mf rates for Futuna were lower, at 8.1% in 1977 (Country report 2001).

Monthly DEC distribution began in 1978 and continued until 1987, when DEC distribution became a biyearly programme that continued until 2002. Following the start of the control programme in 1978, Mf rates dropped to 5.3% in 1978 and 3.2% in 1985 in Wallis, and to 1.7% in 1978 and 0.4% in 1985 in Futuna (country report 2001).

Wallis and Futuna joined PacELF in 1999. The most recent baseline filariasis survey was carried out in 2000–2001 using ICT antigen test cards: 1% antigenaemia was recorded for Wallis and 0% for Futuna. Wallis and Futuna was classified as a partially endemic country according to this survey.

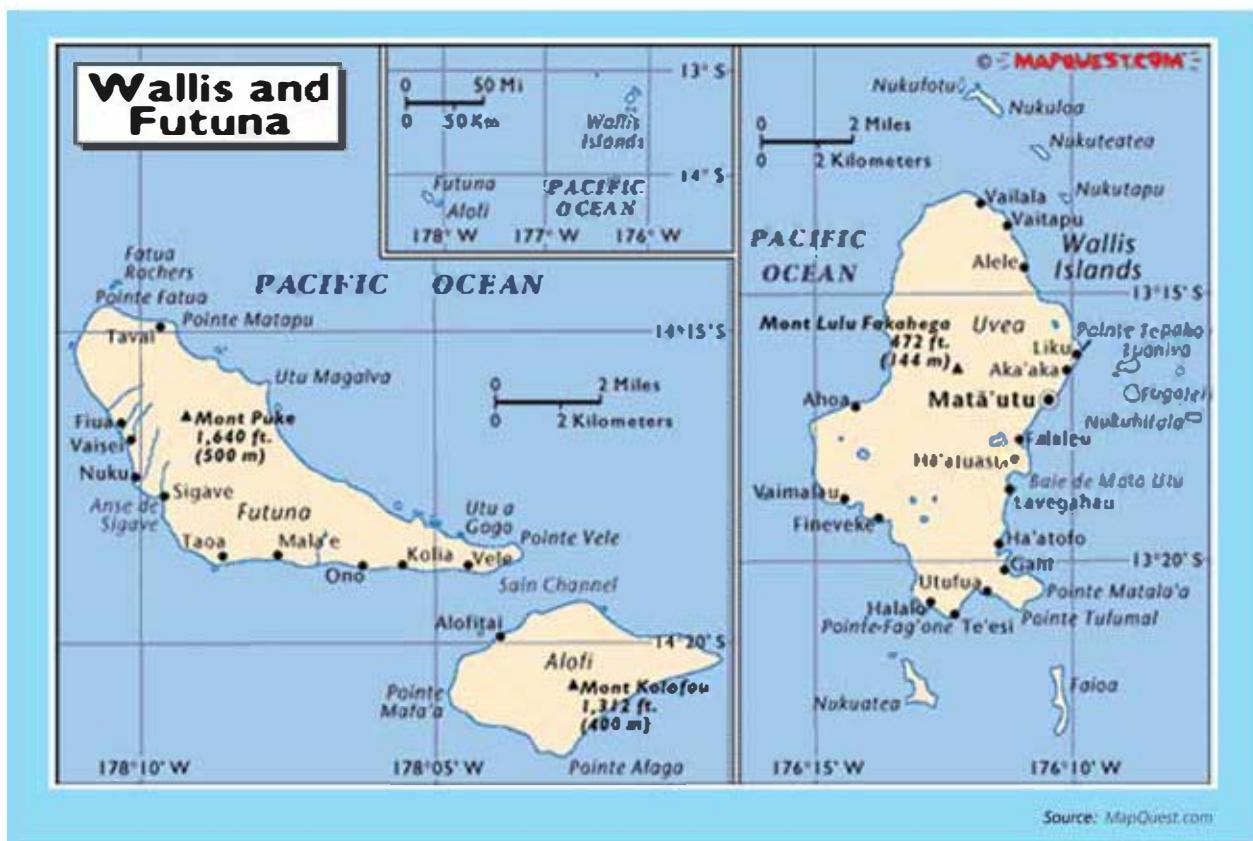
Although Wallis and Futuna is partially endemic, MDA in the whole country using DEC (6 mg/kg) and albendazole (400 mg) began in 2002 under PacELF. The first MDA covered 8522 people (60.2% coverage) (Ministry of Health, 2002 annual report). In 2003, the second MDA covered 9252 people (65.3% coverage) (Ministry of Health, country presentation at Fifth PacELF Annual Meeting in 2003). The third MDA in 2004 treated 9918 people (66.4% coverage).

## 2 Country Profile

### Filariasis Type and Vectors

Filariasis latest status	Partially endemic
Filaria type	<i>Wuchereria bancrofti</i>
Mosquito vectors	<i>Aedes polynesiensis</i>

Source: Culicidae of the Australasian Region, Volume 12, 1989.



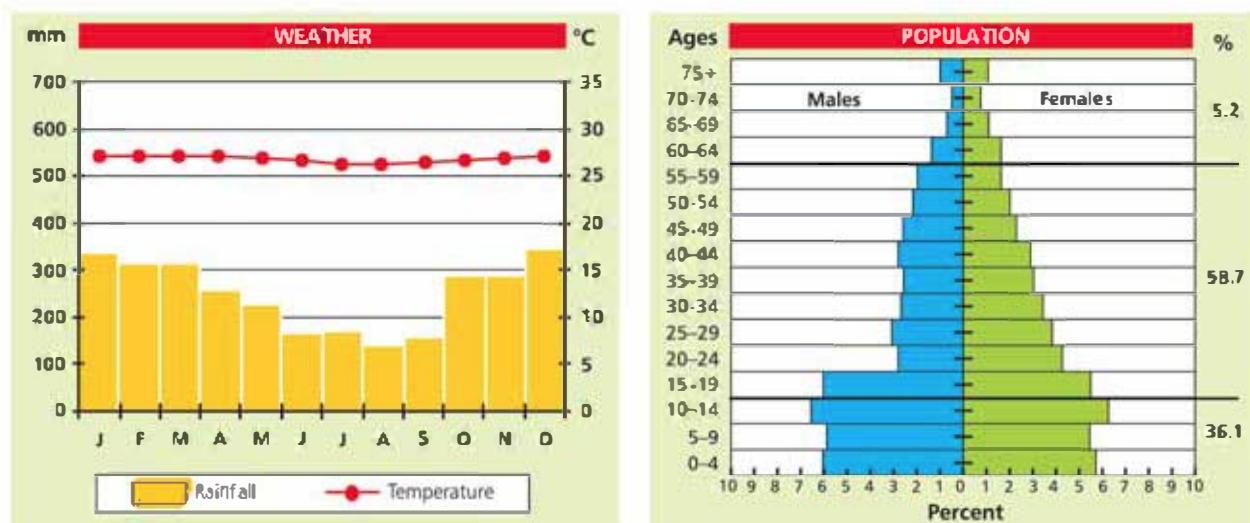
Source: MapQuest.com



## General Information

Capital city	Mata-Utu
Number of islands	3 Islands and 20 Islets
Land area	255 sq km
Languages	French, Wallisian
People	Polynesian (93%), French (7%)
Gross domestic product (GDP) per capita	\$2000
Economy	Copra, fishing, trochus shells, handicrafts, lumber
Total population by census (2003)	14 944
Population estimated (2004)	14 900
Population density (people/km <sup>2</sup> )	105
Infant mortality rate (per 1000 live births) (2000–2003)	7.4
Maternal mortality rate (per 100 000 live births) (1996)	0
Life expectancy at birth (1991–1995)	68.7
Leading causes of mortality (2002)	Diseases of the circulatory system, neoplasms, injuries and external causes, symptoms, signs and findings not elsewhere classified, diseases of the respiratory system

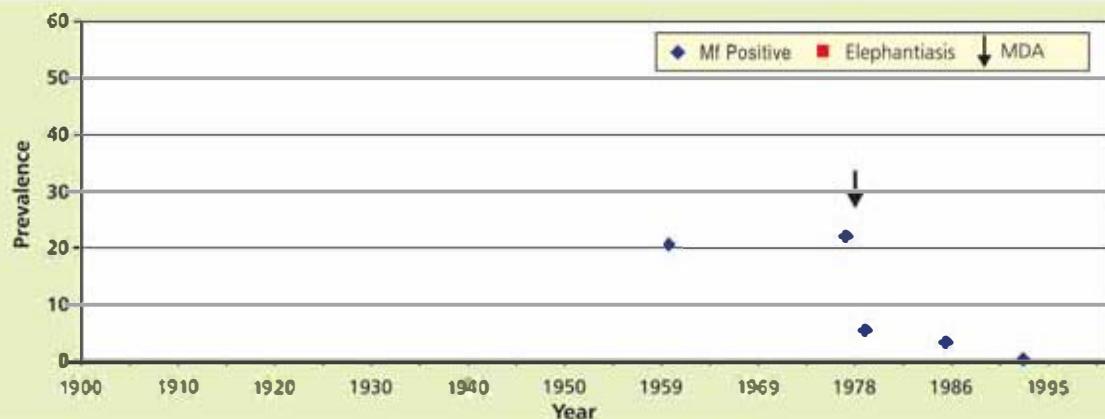
Source: Country Health Information Profile 2004 (WHO Regional Office for the Western Pacific), Secretariat of the Pacific Community (SPC), Lonely Planet Destinations



Source: WorldClimate,  
Temperature: Port Vila 1948 to 1985,  
Rainfall: Port Vila 1948 and 1985

Source: Secretariat of the Pacific Community, 2000

### 3 Filariasis before PacELF, 1900–1995



#### Country Filariasis Activities in the 1900s before PacELF

##### Microfilaria Prevalence and Clinical Surveys

Population/Area	Date	% Mf pos (n)	Noted Clinical Features % (n)	Primary Reference
Wallis	1959	20.4 (1029)		Rageau J, Estienne J (1959)
Wallis	1977	21.8 (1069)		Country report (2001)
Wallis	1978	5.3 (4758)		Country report (2001)
Wallis	1985	3.2 (4308)		Country report (2001)
	1992	0.0 (500)		Country report (2001)



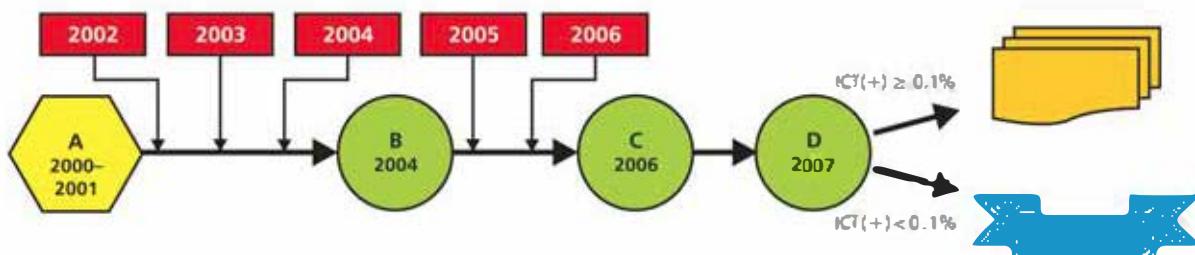
##### Mass Drug Administration or Other Control Measures

Population/Area	Date	Activity	Details	Primary Reference
Nationwide	1978–present	MDA and vector control	Monthly distribution of DEC until 1987 and then twice yearly. Plus vector control.	Country Report (2001)



## 4 PacELF Activity

### PacELF Country Plan



Type	Year	Sampling	Target	Result
A	2001	Convenience	Focal testing around positive cases	ICT: 0.7% (6/803)
B	2004	Cluster	Sentinel sites Wallis	
C	2006	Cluster	Wallis	
D	2007	Complete	340 all 5- to 6-year-old children	

Source: PacMAN Book 2004



### Results of Blood Surveys and MDAs under PacELF

#### Blood Surveys

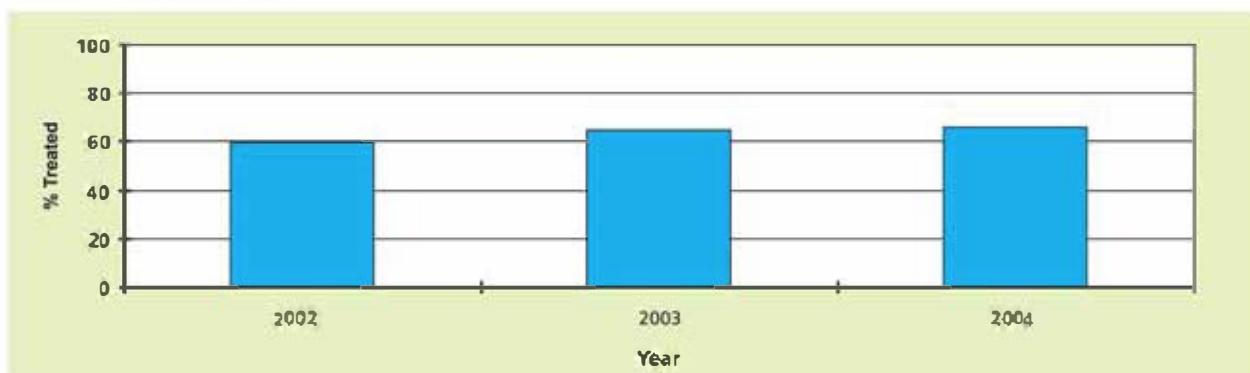
Date	Method	Target	Sampling	No. examined	No. of positives	Positive rate (%)	Remarks	Reference
2001	ICT	Whole area	convenience sample	ICT	6	0.7		Application form

#### MDAs

Date	MDA	Reported population	Estimated population*	Registered population	% Registered	Treated population	% Treated / Reported	% Treated / Estimated*	% Treated / Registered	Reference
2002	1st	14 166	14 966			8522	60.2	56.9		Annual Report 2002
2003	2nd	14 166	14 944	13 540	95.6	9252	65.3	61.9	68.3	Annual Report 2003
2004	3rd	14 944	14 900	12 580	84.2	9918	66.4	66.6	78.8	Presentation in AM6

\*Estimated assuming constant growth rate between latest census and 2004 population estimate (SPC)

**MDA Coverage, 2002–2004**



**Supplies Shipped from PacELF, 2000–2004**

Year	2000	2001	2002	2003	2004
ALB (tablets)	-	16 500	15 600	17 000	-
DEC (tablets)	-	-	-	-	-
ICT (test cards)	-	-	-	-	-

**Partnership:** GSK (albendazole), Institut Louis Malardé

**Distribution Dose of DEC and Albendazole Tablets**

Age and Weight	No. of DEC tablets (100 mg)	No. of albendazole (400 mg) tablets
3- to 6-year-old	1	1
7- to 11-year-old	2	1
12- to 15-year-old	3	1
Adults < 70 kg	4	1
Adults > 70 kg	5	1

**Operational Staff:** Public health medical officer



## Photo Album

### Annual Meeting Group Photos



1999



2000



2001



2002



2003



2004



2005



## Blood Survey

### Registration



Kiribati



Tonga



Tuvalu



Kiribati

### Taking blood



American Samoa



Federated States of Micronesia



Fiji



French Polynesia



## Taking blood



Fiji



Marshall Islands



Niue



Palau



Tonga



Tuvalu



Vanuatu



Tonga



## Recording



Fiji



Tonga



Tuvalu



Kiribati



## MDA

### Workshop



American Samoa



Cook Islands



Fiji



Kiribati



Papua New Guinea



Samoa



Tuvalu



Vanuatu



## Packing



Fiji

## Distribution



Fiji



Samoa



Tonga



Tonga



Vanuatu



Vanuatu



Vanuatu



## Registration



American Samoa



Fiji



Kiribati



Tonga



Samoa



Fiji



Vanuatu



## Treatment



American Samoa



Cook Islands



Fiji



French Polynesia



Kiribati



Tonga



Samoa



Vanuatu



## Treatment



Vanuatu



Fiji



Vanuatu



Kiribati



Tonga

## Calculation



Fiji



Fiji



## Calculation



Cook Islands



Samoa



Samoa



Vanuatu



## Patients

Fiji



**Vanuatu**



## PacELF Home Office



PacELF Home Office team and Mataika House staff



### PacELF Home Office

Mataika House  
Fiji Centre for Communicable Disease Control  
Tawauua, Suva, Fiji



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