Tuberculosis trends in the Pacific: 2000-2006

Ms Kerri Viney* *TB Systems Specialist,TB Section, Public Health Division, Secretariat of the Pacific Community, BP D5 98848, Noumea Cedex, NEW CALEDONIA, Phone: (687) 262 000 extension 214 ; Email: kerriv@spc.int*

Dr Janet O'Connor, *TB Section Head, TB Section, Public Health Division, Secretariat of the Pacific Community, BP D5 98848, Noumea Cedex, NEW CALEDONIA, Phone: (687) 260 116; Email: JanetO@spc.int*

Dr Axel Wiegandt, *TB Medical Officer, TB Section, Public Health Division, Secretariat of the Pacific Community, BP D5 98848, Noumea Cedex, NEW CALEDONIA, Phone: (687) 262 000 Extension 142; Email: Axelw@spc.int*

Mr Mark Lambert, *TB Coordinator, Funding Regional Programmes Section, Public Health Division Secretariat of the Pacific Community, BP D5 98848, Noumea Cedex, NEW CALEDONIA, Phone: (687) 262 000 Extension 462; Email: markl@spc.int*

Dr Helen Cox, *Senior Research Officer The Burnet Institute for Medical Research and Public Health, GPO Box 2284, Melbourne, Victoria 3001, AUSTRALIA, Phone: (61) 3 9282 2111; Email: hcox@burnet.edu.au*

Ms Sandra Downing, *Senior Research Officer,The Burnet Institute for Medical Research and Public Health GPO Box 2284, Melbourne, Victoria 3001, AUSTRALIA, Phone: (61) 3 9282 2111; Email: sdowning@burnet.edu.au*

**Corresponding author*

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Abstract

The objective in this manuscript is to describe the epidemiology of tuberculosis in 19 Pacific Island countries and territories by analysing routine surveillance data from 2000 to 2006. In addition, progress against World Health Organization targets is described. The setting is National Tuberculosis Programmes in 19 Pacific Island countries and territories served by the Secretariat of the Pacific Community.

The study is a descriptive study of routinely collected surveillance data from 19 Pacific Island countries and territories.

In 2006 there were 1585 cases of TB notified in the Pacific region. The case notification rate in the Pacific was 54/100,000 population. Almost half (49%) of all TB notifications were in the subregion of Micronesia, with 42% in Melanesia and 9% in Polynesia. Micronesia had the highest rate of TB in the region with a case notification rate of 145/100,000 population. The TB case notification rate in the Pacific increased by 10% between 2000 and 2006, from 49/100,000 to 54/100,000 population. The highest increase in rates has been in Micronesia, where the TB case notification rate rose by 39% between 2000 and 2006.

In the Pacific in 2006, 71% of all TB notifications were pulmonary, and just over one third (36%) of all TB notifications were sputum smear positive.

One quarter (25%) of sputum smear positive cases were in people aged 15–24 years and slightly more than half of all sputum smear positive cases were in males (52%). In Micronesia this pattern was different; 61% of all sputum smear positive cases were in males.

In 2005, the treatment success rate of new sputum smear positive cases in the Pacific was 85%, equivalent to the WHO target. The treatment success rate of sputum smear positive cases rose from 78% in 2000 to 85% in 2005, an increase of 7%.

In 2005, 4% of all people with TB died, and of those with sputum smear positive TB, 8% died. In 2005 in Polynesia, 13% of all people with sputum smear positive TB died.

Since the year 2000, the rates of TB have increased in the Pacific region, with a relatively large increase in the subregion of Micronesia. Treatment success rates in the same time period have improved and are now at the WHO target of 85%. The conclusion is that to continue to make progress toward TB control in the region, intensified efforts may be needed in the sub-region of Micronesia while support is also maintained at current or increased levels in Melanesia and Polynesia.

Introduction

Tuberculosis (TB) is a major cause of illness and death worldwide. In 2006, there were an estimated 9.27 million incident cases of TB (139/100,000 population), and there were 1.3 million deaths from TB in HIV negative people globally.[1] In addition, there were 456,000 deaths in people who were co-infected with HIV and TB.[1] In the same year, the World Health Organization (WHO) Western Pacific Region accounted for 24% of total TB cases.[1]

The Pacific region comprises 22 island countries and territories with diverse populations, cultures, economies and politics. The region is divided into three subregions – Melanesia, Polynesia and Micronesia – based on ethnic, linguistic and cultural differences.[2] The region is spread over 30 million square kilometers, of which 98% is ocean.[2] Five hundred of the 7500 islands are inhabited and the region is home to 0.1% of the world's population.[2]

Regional social, economic and environmental factors such as a changing global environment, the relative ease and availability of modern travel, and overpopulation have had a significant impact on the health and well-being of Pacific Island people over time. As a result, there has been an increase in 'lifestyle diseases'. There has also been an increase in communicable diseases such as TB.[2]

The Secretariat of the Pacific Community (SPC) is an international organisation that provides technical assistance, policy advice, training and research services to the 22 Pacific Island countries and territories (PICTs) in areas such as health, human development, agriculture, forestry and fisheries.

SPC's TB Section was established within the Public Health Programme in 1998 to develop TB control programmes in four Pacific Island countries (Cook Islands, Kiribati, Samoa and Tonga). Three years later the programme expanded to include the three French territories (French Polynesia, New Caledonia and Wallis and Futuna), Niue and Tokelau. Since the involvement of the Global Fund to fight AIDS, TB and Malaria (GFATM) in the Pacific region began in 2003, and in collaboration with the World Health Organization (WHO) and the US Centers for Disease Control and Prevention (CDC), SPC's responsibilities for TB prevention and control have now expanded to become region wide, although currently, this does not include Papua New Guinea and Pitcairn Islands. SPC works closely with its agency partners, (WHO and CDC) and other stakeholders to provide technical assistance, policy advice and training to staff from National TB Programmes. SPC's TB Section has been collecting and analysing TB data from National TB Programmes since the Section's inception in 1998.

National TB Programmes throughout the Pacific region have adopted the internationally recommended Directly Observed Treatment Short-course (DOTS) strategy and are guided by the targets outlined in the Strategic Plan to Stop TB in the Western Pacific 2006–2010 (Table 1).[3] This strategy outlines the targets of reducing TB prevalence and mortality by 50% by 2010 relative to levels in 2000.[3] These targets are consistent with:

- the targets set by the WHO Regional Committee in 2000 in response to the TB threat in the Western Pacific region, and
- the Global Stop TB Strategy, which aims to contribute to the achievement of the Millennium Development Goals (Table 1). [4]

Table 1: Goals, targets and indicators for TB control

HEALTH IN THE MILLENIUM DEVELOPMENT GOALS	
Goal 6: Combat HIV/AIDS, malaria and other diseases	
Target 6c	Halt and begin to reverse the incidence of malaria and other major diseases
Indicator 6.9	Incidence, prevalence and death rates associated with TB
Indicator 6.10	Proportion of TB cases detected and cured under DOTS
Stop TB Partnership targets	
By 2005	Al least 70% of people with sputum smear positive TB will be diagnosed (i.e. under DOTS strategy), and at least 85% successfully treated
By 2015	The global burden of TB (per capita prevalence and death rates) will be reduced by 50% relative to 1990 levels
By 2050	The global incidence of active TB will be less than 1 case per million population per year
The Strategic Plan to Stop TB in the Western Pacific: 2006–2010 goal	
By 2010	To reduce the prevalence and mortality of TB by one half by 2010 relative to 2000, contributing to the Millennium Development Goals

Materials and methods

This descriptive study is an analysis of routinely collected TB surveillance data, collected, for the most part, by SPC.

TB data were extracted from the SPC TB Section database (a Microsoft Access database). Where data were not available from this database, WHO data were sourced from the annual Global Tuberculosis Reports. [5 6 7 8 9] A comparison of WHO and SPC notification and outcome data was conducted. Where a difference in case notification numbers was found, the higher figure was used. Outcome data were primarily sourced from SPC's database; however, when the total number of recorded outcomes was less than the number of notifications, this was compared with WHO outcome data. If a higher number of outcomes was recorded by WHO, these data were used. SPC's Statistics and Demography Programme provided estimated resident population data. National prevalence estimates were obtained from the relevant WHO annual Global Tuberculosis Reports [5 6 7 8 9] and regional prevalence estimates were derived from these estimates using a methodology consistent with WHO's methodology for estimating national prevalence.

Ethics approval was not sought for this study as it was a descriptive analysis of routinely collected TB surveillance data.

This study covered the period 2000–2006 for the following PICTs: American Samoa, Cook Islands, Commonwealth of the Northern Mariana Islands, Fiji Islands, French Polynesia, Federated States of Micronesia, Guam, Kiribati, Nauru, New Caledonia, Niue, Palau, Republic of the Marshall Islands, Samoa, Solomon Islands, Tonga, Tuvalu, Vanuatu, and Wallis and Futuna.

The data were analysed in two ways, by:

1. comparing data over time, from 2000 to 2006 for TB notifications and from 2000 to 2005 for treatment outcomes, and
2. Analysing in detail the most recent year's data, which was 2006 for TB notifications and 2005 for TB treatment outcomes.

No data were available for Pitcairn Islands or Tokelau. Data from Papua New Guinea were not analysed, because in the study period, SPC did not collect TB data from Papua New Guinea. TB data from Papua New Guinea are included in the 'Global Tuberculosis Report: epidemiology, financing and strategy' WHO report 2009.[1] In some tables in the text, data from Papua New Guinea are included; these figures were sourced from the relevant WHO Global Tuberculosis Reports. [5 6 7 8 9]

Results - Case notifications

Case notification rates in 2006

In 2006, 1585 TB cases were notified in the Pacific region, resulting in a notification rate of 54 cases/100,000 population (Table 2). Almost half (49%) of all TB notifications were diagnosed in the subregion of Micronesia, with 42% in Melanesia and 9% in Polynesia. Of the three Pacific subregions, Micronesia reported the highest notification rate (145 cases/100,000 population), followed by Melanesia (37/100,000 population) and Polynesia (22/100,000 population) (Table 2). If data from Papua New Guinea are included, the case notification rate in the Pacific increases to 165/100,000 population and the rate in Melanesia increases to 178/100,000 population.

Rates varied considerably among PICTs, with Kiribati and the Marshall Islands reporting the highest rates (399 and 276/100,000 populations respectively) and Cook Islands, Wallis and Futuna and American Samoa reporting the lowest rates of 7, 7 and 6/100,000 populations respectively.

Table 2: TB case notifications by type of TB in PICTs, by region and subregion, 2006

Country & Region^	Population (2006)	All notifications		New cases									Previously tested cases				Other	
				Smear positive			Smear negative			Extra-pulmonary			Relapse	Default & failure	Other previously treated	All previously treated	Transfer in	Unknown
		n	Rate	n	Rate	%	n	Rate	%	n	Rate	%	n	n	n	%	n	n
Melanesia																		
FJ	826,473	114	14	71	9	62	17	2	15	26	3	23	0	0	0	0	0	0
NC	238,047	55	23	13	5	24	28	12	51	9	4	16	5	0	0	9	0	0
SI	490,593	366	75	124	25	34	168	34	46	74	15	20	5	0	0	1	0	0
VA	222,088	124	56	42	19	34	37	17	30	43	19	35	0	2	0	2	0	0
PNG	6,193,435	13,532	218	1948	31	14	5969	96	44	4575	74	34	128	0	912	8	0	0
Total	7,970,635	14,191	178	2198	28	15	6219	78	44	4727	59	33	138	2	912	7	0	0
excl. PNG	1,777,201	659	37	250	14	38	250	14	38	152	9	23	10	2	0	2	0	0
Micronesia																		
FSM	110,101	114	104	46	42	40	34	31	30	23	21	20	3	5	0	4	4	2
GU	169,771	45	27	21	12	47	15	9	33	8	5	18	1	0	0	0	0	0
KI	94,010	375	399	131	139	35	117	124	31	123	131	33	4	0	0	1	0	0
MI	52,163	144	276	43	82	30	43	82	30	42	81	29	15	0	0	10	0	0
NA	9700	13	134	3	31	23	4	41	31	5	52	38	0	1	0	8	0	0
CNMI	82,508	75	91	15	18	20	43	52	57	17	21	23	0	0	0	0	0	0
PA	20,031	17	85	8	40	47	3	15	18	4	20	24	0	0	0	0	2	0
Total	538,284	783	145	267	50	34	259	48	33	222	41	28	23	6	0	3	7	2
Polynesia																		
AS	63,924	4	6	3	5	75	0	0	0	1	0	25	0	0	0	0	0	0
CI	13,735	1	7	0	0	0	0	0	0	1	7	100	0	0	0	0	0	0
FP	258,079	76	29	23	9	30	32	12	42	16	6	21	5	0	0	7	0	0
NI	1625	1	62	0	0	0	1	62	100	0	0	0	0	0	0	0	0	0
SA	179,017	30	17	15	8	50	11	6	37	1	1	3	3	0	0	10	0	0
TO	101,064	18	18	14	14	78	3	3	17	1	1	6	0	0	0	0	0	0
TU	9565	12	125	4	42	33	5	52	42	2	21	17	0	0	0	0	1	0
WF	15,263	1	7	1	7	100	0	0	0	0	0	0	0	0	0	0	0	0
Total	642,271	143	22	60	9	42	52	8	36	22	3	15	8	0	0	6	1	0
Pacific	9,151,190	15,117	165	2525	28	17	6530	71	43	4971	54	33	169	8	912	7	8	2
excl. PNG	2,957,756	1585	54	577	20	36	561	19	35	396	13	25	41	8	0	3	8	2

*Rate = Rate per 100,000 population
^Abbreviations are explained in Appendix 1
% = % of all notifications except new pulmonary TB (PTB) sputum smear positive (SS+ve); % of which = % of new PTB reported as SS+ve
Country abbreviations are described in PICT abbreviation list in Appendix 1.

Case notification rates from 2000 to 2006

The rate of case notifications in the Pacific ranged from 42 to 54/100,000 population between 2000 and 2006 (Table 3). Overall, the case notification rate increased by 10% in this time period, from 49/100,000 population to 54/100,000 population (Table 3).

In Melanesia the case notification rate decreased by 10% during the period 2000–2006, from 41/100,000 population in 2000 to 37/100,000 population in 2006 (Figure 1). The case notification rate ranged from 35 to 41/100,000 population (Figure 1).

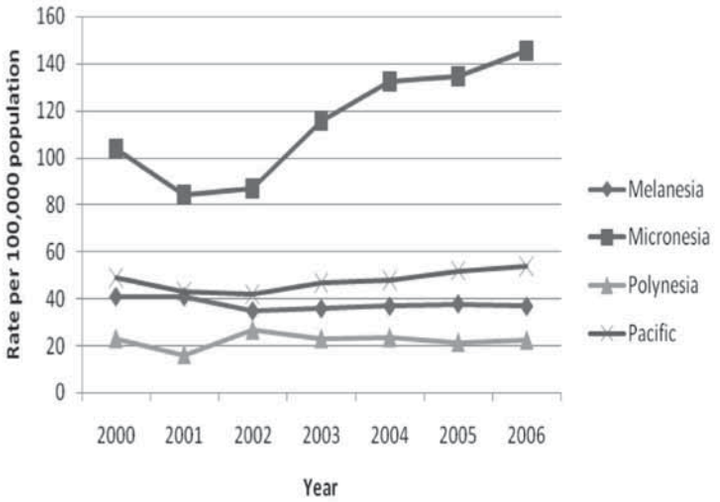
In Micronesia, there was a 39% increase in the case notification rate, from 104/100,000 population in 2000 to 145/100,000 population in 2006 (Figure 1). The notification rate of extra-pulmonary TB (EPTB) increased by 105% (20/100,000 to 41/100,000), and the notification rate of sputum smear positive cases doubled (25/100,000 to 50/100,000). The notification rate of sputum smear negative cases increased by 37% (35/100,000 to 48/100,000) in the same time period.

The notification rate in Polynesia remained relatively constant between 2000 and 2006 (21–23/100,000 population) except for 2001 (16/100,000) and 2002 (27/100,000) (Figure 1). This variation reflects the small number of TB cases reported annually. Overall, there was a small decrease (4%) in case notification rates in Polynesia between 2000 and 2006.

Table 3: Case notifications by type of TB in the Pacific, excluding Papua New Guinea, 2000–2006

		2000	2001	2002	2003	2004	2005	2006
Population estimate		2,724,526	2,763,674	2,802,912	2,842,042	2,881,467	2,920,560	2,959,761
Total notifications	n	1323	1193	1189	1340	1388	1508	1585
	Rate/100,000	49	43	42	47	48	52	54
Sputum smear positive pulmonary	n	452	448	485	497	604	585	577
	Rate/100,000	17	16	17	17	21	20	19
	% of total notifications	34	38	41	37	44	39	36
Sputum smear negative pulmonary	n	468	439	394	473	393	505	561
	Rate/100,000	17	16	14	17	14	17	19
	% of total notifications	35	37	33	35	28	33	35
Extra pulmonary	n	360	275	256	332	337	366	396
	Rate/100,000	13	10	9	12	12	13	13
	% of total notifications	27	23	22	25	24	24	25
Previously treated	Relapse (n)	22	11	27	31	31	29	41
	Default (n)	0	5	4	2	16	16	5
	Failure (n)	2	2	7	4	3	5	3
	Total previously treated	24	18	38	37	50	50	49
	% of total notifications	2	2	3	3	4	3	3
Unknown	n	19	12	12	4	15	10	2
Transfer in	n	0	0	3	3	8	4	8
Unknown/transfer in % of total notifications		1	1	1	1	2	1	1

Figure 1: TB case notification rates by subregion and region, excluding Papua New Guinea, 2000–2006



Type of case notifications

In the Pacific region in 2006, 71% of all case notifications were pulmonary TB and 25% were extra-pulmonary (3% were previously treated and 1% were unknown). This varied slightly between the sub-regions: in Melanesia 76% of all notifications were pulmonary and just under a quarter (23%) were extra-pulmonary, while in Micronesia 67% and 28% were pulmonary and extra-pulmonary respectively, and in Polynesia 78% and 15% of all case notifications were pulmonary and extra-pulmonary respectively. The proportion of case notifications diagnosed with extra-pulmonary TB ranged from 15% to 28% – higher than the 12% reported globally in 2006.[10]

Smear status of case notifications

The DOTS strategy emphasises diagnosis by sputum smear microscopy and WHO expects that 50% or more of all TB cases should be sputum smear positive in countries implementing the DOTS strategy.[11] In 2006 in the Pacific, just over one third (36%) of all cases were sputum smear positive. In Melanesia 38% of all cases were sputum smear positive, in Micronesia sputum smear positive cases comprised 34% of all cases and in Polynesia this figure was 42%.

In countries implementing the DOTS strategy, WHO expects a minimum of 65% of new pulmonary TB cases to be sputum smear positive.[11] When new pulmonary TB cases were analysed, 51% of all new pulmonary TB cases in the Pacific were sputum smear positive. In Melanesia, half (50%) of all new pulmonary TB cases were sputum smear positive, as were 51% in Micronesia and 54% in Polynesia.

Age distribution of sputum smear positive notifications

Within the Pacific region in 2006, the highest proportion of sputum smear positive notifications was in people aged 15–24 (25% of all notifications) (Table 4). Similarly, within all sub-regions in 2006, the highest proportion of sputum smear positive notifications was in people aged 15–24 (Table 4). In Melanesia the proportion of notifications reported in people aged 25–34 was the same as that in people aged 15–24 (22%) (Table 4). Compared with the other subregions, Polynesia had a higher proportion of cases reported in older age groups (i.e. 19% in people aged 65 years and over) (Table 4).

Sex distribution of sputum smear positive notifications

For all case notifications in the Pacific in 2006, the sex distribution was relatively even (52% in males and 48% in females) (Table 4). The sex distribution across the defined age groups was also similar (Table 4).

In contrast to Melanesia and Polynesia, where the sex distribution was relatively even, in Micronesia 61% of notifications were in males and 39% were in females (Table 4). This difference was observed in all age groups except for children aged 0–14 and people aged 55–64 (Table 4). The largest differences were seen in the 35–44, 45–54 and 65 and over age groups, where the ratio of male to female notifications was more than 2:1 (Table 4). The reasons for a different sex distribution in Micronesia are not well understood and may be a topic for further research should this be noted as an ongoing trend.

Table 4: New sputum smear positive case notifications by age group and sex, subregion and region, excluding Papua New Guinea, 2006

	Melanesia					Micronesia					Polynesia					Pacific region				
	Male		Female		Total	Male		Female		Total	Male		Female		Total	Male		Female		Total
Age group	*n*	%	*n*	%	*n*	*n*	%	*n*	%	*n*	*n*	%	*n*	%	*n*	*n*	%	*n*	%	*n*
0–14	4	1	8	3	12	8	3	10	4	18	1	2	2	3	3	13	2	20	3	33
15–24	25	9	38	13	63	38	16	31	13	69	7	12	9	16	16	70	12	78	13	148
25–34	31	11	30	11	61	24	10	12	5	36	3	5	5	9	8	58	10	47	8	105
35–44	13	5	18	6	31	30	12	12	5	42	4	7	4	7	8	47	8	34	6	81
45–54	16	6	28	10	44	27	11	9	4	36	3	5	3	5	6	46	8	40	7	86
55–64	24	8	17	6	41	9	4	16	7	25	4	7	2	3	6	37	6	35	6	72
65+	16	6	15	5	31	12	5	6	2	18	6	10	5	9	11	34	6	26	4	60
All	129	46	154	54	283	148	61	96	39	244	28	48	30	52	58	305	52	280	48	585

NB: Data from some PICTs were incomplete

Case detection

The TB case detection rate measures the number of new smear positive TB patients reported to the Ministry of Health each year among the number of new smear positive TB patients estimated to occur in the country in the same year.[12] This measures the National TB Programme's ability to detect and identify new smear positive TB cases.[12] The regional target for case detection is above 70%.[3] In the Pacific in 2006, the case detection rate was 66% (excluding Papua New Guinea). In the sub-regions the case detection rates for new smear positive TB cases were 81%, 77% and 54% in Micronesia, Polynesia and Melanesia respectively.

Prevalence of TB

The prevalence of TB in a country is the number of TB cases at any given point in time and can be estimated directly (using surveys) or indirectly (i.e. TB incidence multiplied by the average duration of disease).[13] The prevalence of TB is a key indicator to measure the impact of a National TB Programme, and the regional goal is to halve the prevalence of TB by 2010 relative to the levels in 2000.[3] In 2006, the prevalence of TB (all forms) in the Pacific was 86/100,000 population. This was highest in Micronesia (162/100,000 population) followed by Melanesia and Polynesia at 84 and 32/100,000 respectively. Recent estimates carried out by SPC

estimate that the TB prevalence rate in the region is decreasing by 5.6% per year (by 3.4% in Polynesia, 4.9% in Micronesia and 6.2% in Melanesia). These annual declines may not result in the regional target being reached by 2010, but prevalence should have declined by approximately 43% in the period 2000–2010 – close to the target of a 50% decline.

Treatment outcomes

Treatment success rate in 2005: sputum smear positive cases

In 2005 in the Pacific, the treatment success rate for new sputum smear positive cases was 85% (Table 5). The highest treatment success rate was reported in Micronesia (91%), followed by Melanesia (82%) and Polynesia (81%) (Table 5). These results are close to or exceed the WHO target of 85% treatment success for new sputum smear positive cases. [6]

Table 5: Treatment outcomes of new sputum smear positive TB cases, by Pacific island country and territory, subregion and region, 2005 cohort

Country and region	Number notified	Number with outcome recorded	% of notified with outcome	Cured		Completed		Died		Failed		Default		Transferred		Treatment success
	n	*n*	*%*	*n*	*%*	*n*	*%*	*n*	*%*	*n*	*%*	*n*	*%*	*n*	*%*	*%*
Melanesia																
FJ	63	63	100	48	76	0	0	7	11	0	0	7	11	1	2	76
NC	18	16	89	14	78	1	6	1	6	0	0	0	0	0	0	83
SI	169	178	105	95	53	56	31	14	8	0	0	8	4	5	3	85
VA	35	61	174	38	62	9	15	8	13	5	8	1	2	0	0	77
PNG	1805	1346	75	767	42	188	10	54	3	14	1	256	14	67	4	53
Total	2090	1664	80	962	46	254	12	84	4	19	1	272	13	73	4	58
excl. PNG	285	318	112	195	61	66	21	30	9	5	2	16	5	6	2	82
Micronesia																
FS	32	41	128	27	66	13	32	1	2	0	0	0	0	0	0	98
GU	28	27	96	23	82	0	0	3	11	0	0	0	0	1	4	82
KI	123	123	100	75	61	39	32	8	7	0	0	1	1	0	0	93
MI	48	47	98	41	85	1	2	1	2	0	0	1	2	4	9	88
NA	1	2	200	1	50	0	0	1	50	0	0	0	0	0	0	50
CNMI	12	15	125	11	73	0	0	0	0	0	0	0	0	4	27	73
PA	3	3	100	3	100	0	0	0	0	0	0	0	0	0	0	100
Total	247	258	104	181	73	53	21	14	6	0	0	2	1	9	4	91
Polynesia																
AS	3	4	133	3	75	0	0	0	0	0	0	0	0	1	25	75
CI	1	1	100	1	100	0	0	0	0	0	0	0	0	0	0	100
FP	21	21	100	15	71	0	0	5	24	1	5	0	0	0	0	71
NI	0	0	N/A	0		0	N/A	0	N/A	0	N/A	0	N/A	0	N/A	N/A
SA	11	15	136	11	73	3	20	0	0	0	0	0	0	1	7	93
TO	11	11	100	8	73	0	0	2	18	0	0	0	0	1	9	73
TU	5	6	120	6	100	0	0	0	0	0	0	0	0	0	0	100
WF	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total	53	58	109	44	76	3	5	7	12	1	2	0	0	3	5	81
Pacific	2390	1980	83	1187	50	310	13	105	4	20	1	274	11	85	4	63
excl. PNG	585	634	108	420	66	122	19	51	8	6	1	18	3	18	3	85

The number of notified cases is used as the denominator for calculating treatment outcomes unless it is less than the sum of outcomes, in which case sum of outcomes is used.
Treatment success = sum of cured and completed treatment divided by denominator as described above.

Treatment success rates in 2005: sputum smear negative, extra pulmonary and re-treatment cases

The treatment success rate for sputum smear negative cases notified in the Pacific in 2005 was 70%; in Polynesia it was 78%, followed by Melanesia at 73% and Micronesia at 66%.

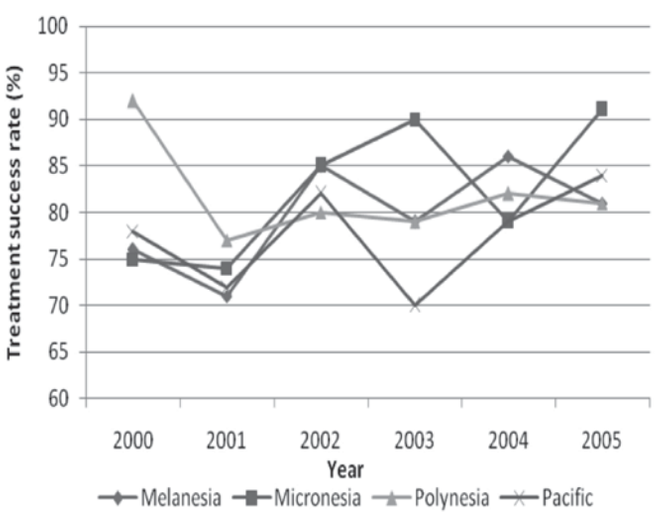
The treatment success rate for extra-pulmonary TB cases notified in the Pacific in 2005 was 71%. In the sub-regions, Micronesia reported a treatment success rate of 79%, followed by Polynesia at 75% and Melanesia at 60%.

The treatment success rate for previously treated cases notified in the Pacific in 2005 was 58%. In the sub-regions the treatment success rates for previously treated cases were 83% in Polynesia, 69% in Melanesia and 47% in Micronesia.

Treatment success rates from 2000 to 2005: new sputum smear positive cases

The treatment success rates for new sputum smear positive cases in the Pacific has risen from 78% in 2000 to 84% in 2005, an increase of 8% (Table 6).

Figure 2: Treatment success rates for new sputum smear positive TB cases, by subregion and region, excluding Papua New Guinea, 2000–2005



In Melanesia, the treatment success rate for new sputum smear positive cases increased by 5% between 2000 and 2005, from 76% in 2000 to 81% in 2005 (Figure 2). Micronesia reported a constant increase in the treatment success rate in sputum smear positive cases, from 75% in 2000 to 91% in 2005 (i.e. a 16% increase) (Figure 2). In Polynesia, the treatment success rate decreased by 11% between 2000 and 2005 (from 92% in 2000 to 81% in 2005). All sub-regions and the Pacific region as a whole are close to or have exceeded the WHO target of a treatment success rate of 85% in sputum smear positive cases.

Table 6: Treatment outcomes for new sputum smear positive cases in the Pacific, excluding Papua New Guinea, 2000–2005

	200	200	200	200	200	200
Notification	45	44	48	49	60	58
Total	397	37	46	40	54	58
Notifications with outcomes	88	8	9	8	9	10
Recorded treatment success	78	7	8	7	7	8
Cure	26	26	32	30	37	36
Complete	9	6	6	4	10	12
Die	19	1	3	2	4	5
Failure	3	0	4	6	1	6
Default	13	1	1	1	1	1
Transfer	9	1	1	8	6	1

The number of notified cases is used as the denominator for calculating treatment outcomes unless it is less than the sum of outcomes, in which case sum of outcomes is used.
Treatment success = sum of cured and completed treatment divided by denominator as described above.

Mortality

In 2005, the mortality rate for all case notifications in the Pacific was 4%, and this was similar across the sub-regions (4% in Melanesia, 5% in Micronesia and 5% in Polynesia) (Table 7). For sputum smear positive TB cases the mortality rates were higher, with a rate of 8% in the Pacific, 9% in Melanesia, 6% in Micronesia and 13% in Polynesia (Table 7).

Table 7: Mortality in TB cases by type of TB, PICT, subregion and region, 2005 cohort

Country and region	Number notified	Number with outcome recorded	% of notified with outcome	Cured		Completed		Died		Failed		Default		Transferred		Treatment success
	n	*n*	*%*	*n*	*%*	*n*	*%*	*n*	*%*	*n*	*%*	*n*	*%*	*n*	*%*	*%*
Melanesia																
FJ	63	63	100	48	71	0	0	7	10	0	0	7	10	1	1	71
NC	18	16	89	14	88	1	6	1	6	0	0	0	0	0	0	83
SI	169	178	105	95	53	56	31	14	8	0	0	8	4	5	3	85
VA	35	61	174	38	62	9	15	8	13	5	8	1	2	0	0	77
PNG	1805	1346	75	767	57	188	14	54	4	14	1	256	19	67	5	53
Total	2090	1664	80	962	46	254	12	84	4	19	1	272	13	73	4	58
excl. PNG	285	318	112	195	61	66	21	30	9	5	2	16	5	6	4	82
Micronesia																
FS	32	41	128	27	66	13	32	1	2	0	0	0	0	0	0	98
GU	28	27	96	23	82	0	0	3	11	0	0	0	0	1	4	82
KI	123	123	100	75	61	39	32	8	7	0	0	1	1	0	0	93
MI	48	47	98	41	85	1	2	1	2	0	0	1	2	4	9	88
NA	1	2	200	1	50	0	0	1	50	0	0	0	0	0	0	50
CNMI	12	15	125	11	73	0	0	0	0	0	0	0	0	4	27	73

cont...

PA	3	3	100	3	100	0	0	0	0	0	0	0	0	0	0	100
Total	247	258	104	181	73	53	21	14	6	0	0	2	1	9	4	91
Polynesia																
AS	3	4	133	3	75	0	0	0	0	0	0	0	0	1	25	75
CI	1	1	100	1	100	0	0	0	0	0	0	0	0	0	0	100
FP	21	21	100	15	71	0	0	5	24	1	5	0	0	0	0	71
NI	0	0	N/A	0		0	N/A	0	N/A	0	N/A	0	N/A	0	N/A	N/A
SA	11	15	136	11	73	3	20	0	0	0	0	0	0	1	7	93
TO	11	11	100	8	73	0	0	2	18	0	0	0	0	1	9	73
TU	5	6	120	6	100	0	0	0	0	0	0	0	0	0	0	100
WF	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total	53	58	109	44	76	3	5	7	12	1	2	0	0	3	5	81
Pacific	2390	1980	83	1187	50	310	13	105	4	20	1	274	11	85	4	63
excl. PNG	585	634	108	420	66	122	19	51	8	6	1	18	3	18	3	85

The number of notified cases is used as the denominator for calculating treatment outcomes unless it is less than the sum of outcomes, in which case sum of outcomes is used.
Papua New Guinea outcome data not available for SS-ve, EPTB or previously treated cases.

Discussion

DOTS, the internationally recommended TB control strategy, has been implemented incrementally in the Pacific region since 1998. PICTs have been reporting TB data to SPC's TB Section since this time.

Since 2000, when TB data collection became more comprehensive and complete, TB case notification rates have increased by 10%. Most of this increase is due to a large relative increase (39%) in Micronesia. Rates in Melanesia and Polynesia have decreased in the same time period by 10% and 4% respectively.

Intensified efforts may be needed in the sub-region of Micronesia if TB is going to be effectively controlled in the Pacific. Some of these efforts are already in place. Since October 2006, the Quality TB Epidemic Control project has been implemented in Kiribati with the following objectives:

1. To improve the quality and capacity of the National TB Programme to effectively address the TB epidemic crisis in Kiribati, including the emerging issues of multi-drug resistant tuberculosis (MDR-TB) and TB/HIV co-infection;
2. To enhance TB laboratory diagnostic capacity and TB outpatient services and to strengthen the partnership between them;
3. To maintain case detection and treatment success rates above 90% by strengthening the capacity of community-based workers to manage treatment, including carrying out directly observed drug treatment and contact tracing around sputum smear positive index cases; and
4. To conduct relevant and appropriate operational research on the impact of TB on the community, in order to develop more effective future intervention tools.[14]

Further, in the midst of an outbreak of MDR-TB, agencies, donors and other stakeholders have been working in the Federated States of Micronesia and Republic of Marshall Islands to prevent further cases of MDR-TB, treat all cases of TB effectively using standardised TB drug regimens and directly observed treatment, and strengthen the National TB Programme. [15]

In addition, since July 2008, 11 of the 22 PICTs have received funds from the Global Fund to Fight AIDS, TB and Malaria as part of a five-year multi-country TB grant which aims to improve equitable access to quality DOTS services for the urban poor, marginalised outer island populations and other identified vulnerable groups. Five of the seven Micronesian countries receive funding under this grant and the Micronesian countries with the highest rates of TB are recipients of grant funding.

The overall goal of the grant is to reduce the mortality and prevalence of TB by 2010 relative to 2000, thereby contributing to the achievement of the Millenium Development Goals. The objectives of the grant (which are those of the Strategic Plan to Stop TB in the Western Pacific: 2006–2010) are to:

1. Sustain and optimise the quality of DOTS and surpass the '70/85' targets;
2. Ensure equitable access to high-quality care for all people with TB; and
3. Adapt DOTS to respond to MDR-TB and TB/HIV co-infection.[16]

It is difficult to determine the underlying causes for the increase in TB case notifications in Micronesia. In some countries around the world, the important factors that have impacted the TB epidemic have been HIV and drug resistance.[17] In the Pacific, with the exception of Papua New Guinea, the prevalence of HIV in incident TB patients is thought to be low and the impact of HIV is not through to be a major contributing factor to the increase of TB.[18 19] Similarly, drug resistance has not historically been common, although a recent outbreak of two strains of MDR-TB in Chuuk, Federated States of Micronesia has caused concern and as a result of intensified case finding, notifications of drug resistant cases have increased.[10] This, combined with the recent cases of MDR-TB in the Marshall Islands suggests that there may be more MDR-TB to be diagnosed in some areas of the Pacific in the future (personal communication- Dr Boris Pavlin).

Other factors at the population, individual and health system levels may have a significant effect on the epidemiology of TB in the Pacific; these may include overcrowding, relative poverty, smoking, diabetes, malnutrition, lack of educational opportunities and access to health services.[17] The influence of some of these factors on TB in the region is not well understood and research into some of these areas may yield important information that can be translated into public health policy.

In addition to intensified efforts in Micronesian countries it will be important to support and strengthen National TB Programmes in Melanesia and Polynesia. Some of the PICTs in these sub-regions also have high rates of TB (i.e Solomon Islands, Vanuatu and Tuvalu) and require further strengthening of National TB Programmes and health systems to control TB and meet regional and international targets. In addition, in some Pacific island countries and territories (particularly in Melanesia) the case detection rate for new sputum smear positive cases is relatively low and concerted efforts should be directed towards increasing case detection in these countries. Apart from the five PICTs in Micronesia mentioned above (i.e. Federated States of Micronesia, Kiribati, Marshall Islands, Nauru and Palau), the Global Fund Pacific multi-country TB grant funds an additional six PICTs in Melanesia and Polynesia, and over the next five years concerted efforts to strengthen the National TB Programme will be taking place in these countries.

In some countries, case detection is well below the target of 70% and efforts to detect and successfully treat TB cases need to be strengthened. This may temporarily increase TB case notification rates further, but the eventual impact should be a decrease in TB cases.

In lower-burden countries it will be important to maintain a well functioning National TB Programme with sufficient resources and public health infrastructure dedicated to TB control lest TB rates rebound once resources are diverted from TB control, as has occurred in the past.[20] In these countries, elimination of TB may be the eventual goal.

Conclusion

The internationally recommended DOTS strategy has been implemented throughout the Pacific with the support of national Ministries of Health, SPC, WHO, CDC and other partners. Since 2000, TB case notification rates have risen and treatment success and case detection rates are close to the regional targets. In order to better understand the reasons behind the increase in case notification rates, further research may be needed. In the meantime, efforts to control TB and strengthen health systems should be reinforced in Micronesia while support for National TB Programmes in Melanesia and Polynesia should be maintained – and augmented where appropriate – to achieve regional and international TB control targets.

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Appendix 1: Pacific island country and territory abbreviation list

FJ: Fiji Islands
NC: New Caledonia
SI: Solomon Islands
VA: Vanuatu
PNG: Papua New Guinea
FSM: Federated States of Micronesia
GU: Guam
KI: Kiribati
MI: Marshall Islands
NA: Nauru
CNMI: Commonwealth of the Northern Mariana Islands
PA: Palau
AS: American Samoa
CI: Cook Islands
FP: French Polynesia
NI: Niue
SA: Samoa
TO: Tonga
TU: Tuvalu
WF: Wallis and Futuna

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Publisher House: Massey University, Directorate Pasifika@Massey
Pasifika Leadership: An Issue of Quality and Relevance
Author: Dr S. Langi Kavaliku (Hu'a Kava-mei-Liku)
The Theme on which I was asked to talk to you about this evening is Personal Foundations of Pasifika Leadership: An issue of Quality and Relevance. Furthermore, amongst the objects of this particular Programme—as stated in the Briefing Notes[1] I was given—are three issues. Notes for a talk to Participants in the Pacific Health Leadership Development Programme 2006 on "Being a Pacific Leader" – Module Two: Individual Leadership at Hamilton,
New Zealand; July 12, 2006.

- Understanding Pacific Cultural values and their influence
- One's perception and thinking; and
- Cultural values are integral to leadership and for this

programme in particular, in the New Zealand setting.

I would like firstly, to comment on Personal Foundations of Leadership in relation to my own experience, then secondly how I think it may relate to leadership issues in general and your Leadership Development Programme in the New Zealand context in particular.

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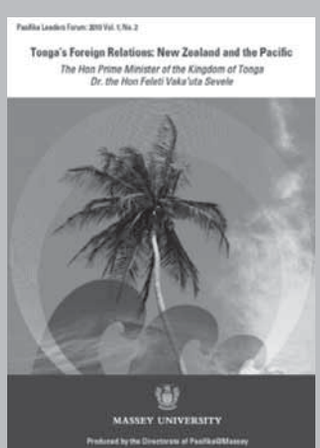

NZ $30.00

Pasifika Leaders Forum: 2010 Vol. 1; No. 2
Tonga's Foreign Relations: New Zealand and the Pacific

By: The Hon Prime Minister of the Kingdom of Tonga,
Dr. Hon. Feleti Vaka'uta Sevele

Our relationship with New Zealand is a very close and strong one, and is based on mutual respect for each other's sovereignty and integrity. We value very much this relationship and the Government of Tonga has always endeavoured to maintain and deepen this relationship. The establishment of our High Commission post in Wellington is a reflection not only of the importance of this relationship but also of the increasing demand for such a mission from the growing number of our people who have come to study, to work or to live in new Zealand. New Zealand aid is an integral part of our relations, and contributes significantly to our development programme. The Government and the people of Tonga are most grateful to the New Zealand Government for the annual migration quota system, which allows 250 people to come and live here. This is one of the new and significant milestones in our relationship. Over the past year we have had the Recognised Seasonal Employers pilot scheme, which allows NZ employers to recruit workers from the Pacific Islands including Tonga for seasonal work in horticulture and viticulture.

The primary aim of the Pacific Islands Forum, created in August 1971 at the instigation of the Prime Ministers of Fiji, Tonga, Samoa, Cook Islands and Nauru, and supported by the Prime Ministers of New Zealand and Australia, was to create a political forum whereby Leaders would come together to discuss ways in which they could help each other, "as neighbours and partners", overcome the major social, economic, environmental.

For further enquiries please contact:
Directorate Pasifika@Massey,
Massey University, Auckland
Phone 09 - 414 0800 ext 9767
or Pacifikalink@massey.ac.nz
Masilamea Press,
masilameapress@xtra.co.nz

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Masilamea Press