

THE POTENTIAL DEMOGRAPHIC IMPACT OF HIV/AIDS IN THE PACIFIC

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The number of HIV infections and cases of AIDS reported in the Pacific Island nations is growing steadily. Since many, if not all, of the risk factors for HIV infection are present in the Pacific, without change in behaviors that place people at risk of infection the potential exists for an HIV/AIDS epidemic. This article shows that such an epidemic would considerably increase mortality and slow but not reverse population growth in many Pacific Island countries. As yet, well-designed, multisectoral responses to the threat of an epidemic are lacking. The longer such responses are delayed, the larger will be the epidemic and the greater its potential social and economic costs.

HIV/AIDS IS THE SINGLE MOST IMPORTANT new health issue facing the Pacific, yet as noted by Ati George Sokomanu “we have progressed very little in our understanding of those issues [surrounding the epidemic] but the debates have got louder” (1995:4). Two recent studies, one a collection of papers organized by the South Pacific Commission and published in a special issue of *Pacific Health Dialog* and the other a study commissioned by the United Nations (1996), have contributed greatly to our understanding of the risk factors underlying the epidemic and the possible impacts on the

health system and the economy more generally.¹ Relatively little attention has been paid to the likely demographic impacts of the epidemic.

Estimating the demographic consequences of HIV/AIDS requires estimates of the impact of HIV infection on fertility, mortality, and international migration. HIV/AIDS could affect fertility by reducing the number of years during which women can bear children or by changing the number of children they decide to have. With an average incubation period of ten years, infected women will generally live most of their reproductive years, but the reproductive decisions they make can significantly alter fertility. In response to HIV infection couples may avoid pregnancy rather than risk giving birth to children who will be infected or soon orphaned. Uninfected couples may reduce their fertility if they expect to take in the children of infected relatives. Other changes in behavior designed to reduce the spread of HIV, such as reduced sexual activity and greater use of condoms, may also reduce fertility. Conversely, HIV-positive parents may continue to have children so that no one will suspect they are infected or to have more births than they would otherwise so that they are survived by at least some children. Uninfected parents may decide to have more children so that, if some become infected, they have a sufficient number of children who survive to take care of them in old age. These considerations are becoming more important as heterosexual transmission grows. By mid-1994 one in five individuals diagnosed as infected with HIV was a child (Rakasetta 1995:142).

To date, only a few studies of the impact of HIV infection on fertility have been carried out. In Zaire, studies show that HIV-positive women are unresponsive to counseling and testing programs designed to prevent birth (Ainsworth and Over 1994:213–214). A recent study by Sewankambo et al. (1994) in the Rakai District of Uganda, where 13 percent of adults were seropositive, found fertility of HIV-infected women to be slightly lower than that of uninfected women. However, Bongaarts (1995) points out that this difference is likely to be at least partly due to the higher prevalence of other STDs among the HIV-positive women. In the Pacific, the age of infection is such that women are unlikely to die before their key reproductive years.

While all of the behavioral responses noted are possible reactions in the Pacific, it is likely that the net effect of HIV on fertility will be small. Women's status in the Pacific is such that men control decisions (Emberson-Bain 1994). In this situation, women have little choice but to continue child-bearing, especially if they fear informing their husband of their HIV status or questioning his. In addition, women's ability to make informed decisions on fertility based on HIV status depends on their ability to gain access to testing in an acceptable, preferably anonymous, setting. This is particularly problematic in the Pacific where testing facilities are limited, the small size

of the communities and cultural factors make it difficult to maintain confidentiality, and negative attitudes toward those infected and their families are prevalent (Sarda and Harrison 1995; Vete 1995; United Nations 1996). Our assumption of no impact of HIV status on fertility is supported by information gathered in confidential interviews with doctors in Papua New Guinea and Fiji. Some women who are aware that they are HIV-positive continue to become pregnant and, because of this, many doctors are concerned about a substantial increase in pediatric AIDS cases.²

Higher rates of HIV/AIDS in the most significant migrant-destination countries—Australia, New Zealand, and the United States—may reduce the flow of migrants from Pacific Island nations because the benefits of migration may now be perceived as being lower (since a migrant may become infected with HIV). That is, the increased risk of death reduces the expected value of the migrants' earnings and remittances. Alternatively, because of a reduction in expected earnings and remittances, more migrants may be sent to insure a particular remittance flow. Conversely, a significant AIDS epidemic in the Pacific could result in the imposition of a ban on migration from island nations. Although such impacts are possible, they are not very likely, so we assume that international migration from the Pacific will be little affected by HIV/AIDS. What has occurred in other countries, Thailand for example, is externally imposed requirements for HIV testing of all overseas laborers bound for specific destinations. Australia has tested overseas students. In other countries, such as the Philippines, there has been testing of returning contract workers. Similar policies on testing of migrants have been discussed in some Pacific countries.

The impact of HIV on mortality trends depends upon the distribution of the lag (the incubation period) between HIV infection and AIDS, and between AIDS and death. In developed countries, it is generally accepted that the median time between infection and AIDS is ten years. The time between developing the illnesses that define AIDS and death is about two years in industrialized countries (Osmond 1994), but usually a year or less in developing countries (Daley 1994). There is debate, though, over the length of the incubation period from HIV to AIDS in developing countries. Estimates, based on incomplete data, vary from five to ten years (Ainsworth and Over 1994; Stover 1993a, 1993b). Recent findings by Leroy et al. (1995) throw considerable doubt on the likelihood of a shorter incubation period in Africa. Rising seroprevalence rates among women of childbearing age increase infection rates among babies, leading to a rise in infant mortality. In the absence of maternal treatment with AZT, 20 to 50 percent of babies born to HIV-positive mothers are themselves infected, significantly reducing their average life expectancy. As a consequence of AIDS, adult mortality

rates in some African countries have doubled or tripled, and AIDS is now the major cause of adult deaths and a growing cause of child mortality (Ainsworth and Over 1994:204). In Asia, Chin (1995) estimates that by the end of the decade AIDS will be the leading cause of death among young and middle-aged Thai adults and even in Hong Kong, which has a low HIV prevalence, AIDS mortality will account for about 20 percent of deaths among adults in the 20–49 age group.

Thus, the main impact of AIDS on population growth occurs through increasing mortality of infants and children as well as adults. Estimates of the increased mortality due to AIDS are usually obtained from statistical extrapolations of known AIDS or HIV cases or from complex models of the disease process (see Bos and Bulatao 1992). To measure the impact of increased mortality on the overall rate of population growth, the estimates of AIDS mortality are linked to a standard cohort-component model used to produce population projections. A comparison of the projection with and without AIDS deaths shows the impact of AIDS on population size and growth.

In this study, we will present estimates of the impact an AIDS epidemic could have on mortality in the Pacific and discuss the possible impact on rates of population growth.

The Impact of AIDS on Mortality

At the present time the only projection of AIDS deaths in Pacific Island nations is Kault and Jenkins 1995. They model the disease process in Papua New Guinea and project that the number of deaths from AIDS in 2005 could be between 700 and 2,500. The annual number of deaths projected rises rapidly after that, until it reaches a plateau around the year 2030. Rakaseta (1995) does not explicitly project deaths from AIDS but she does predict that the number of AIDS cases will double or triple between 1994 and 2000.³

The approach of Kault and Jenkins is quite complex and requires considerable information that is unlikely to be available in most Pacific Island nations. In most Pacific Island nations the small size of the populations involved, the high level of migration, and uncertainties in current knowledge of HIV seroprevalences, levels of sexual risk behavior, and the extent of commercial sex make it difficult at present to make projections for the future course of the epidemic (Sarda and Harrison 1995; Rakaseta 1995). Since we are primarily interested in investigating the potential demographic impact for the Pacific nations as a whole rather than a specific nation, we use a less-complex approach to estimate the potential impact of AIDS on

mortality. This approach relies on an observed simple linear relationship between the seroprevalence rate and AIDS mortality: the number of AIDS deaths per 1,000 population in a mature epidemic is about half the seroprevalence rate among adults (Bongaarts 1994:199–200).⁴ If 10 percent of the population eventually become infected, the number of deaths per 1,000 of population (the crude death rate) would be 5 per 1,000 higher. If the epidemic becomes very severe and 20 percent of the population become infected, the crude death rate would increase by 10 deaths per 1,000 population. Thus, if an estimate of seroprevalence is available, an estimate of AIDS deaths can be calculated. Individual countries may vary somewhat from this association because of differences in age-structure, mode of transmission, culture, and other factors but in the absence of country-specific epidemiological models it will provide a useful indication of the likely demographic impact of HIV/AIDS. Bongaarts (private correspondence) has found that this rule works well in North America and Europe where the epidemic is mature. In sub-Saharan Africa, he feels that 0.4 is a better approximation, and in Asia, where the epidemic is newest and rapidly expanding, the multiplier is currently about 0.15. Thus the mortality estimates given in this article represent an estimate of the impact at the mature stage of an epidemic—what might eventually happen in the Pacific. The current impact is probably closer to the lower multiplier that Bongaarts estimates for Asia.⁵

Reliable estimates of HIV-seroprevalence rates for Pacific Island nations do not exist because these countries do not have surveillance systems in place to test for HIV (Sarda and Harrison 1995; United Nations 1996). In countries with such systems, national estimates of HIV prevalence are often based on data from pregnant women or blood donors. While subject to error, this procedure is believed to give reasonable approximations of HIV seroprevalence in most countries (Bongaarts 1994).⁶ For most Pacific Island nations the primary source of available data on HIV/AIDS is the number of reported cases of HIV and AIDS. However, the number of people actually HIV-positive or with AIDS is greater than the number of reported cases shown in Table 1. Because of fear and the stigma attached to HIV infection, many people avoid testing (Vete 1995). In addition, there is a lack of diagnostic facilities and supplies and, in some countries, a reluctance or failure of medical personnel and governments to report the full extent of infection. For AIDS cases, there is the additional problem of an unwillingness to acknowledge and sometimes an inability to clinically diagnose cases of AIDS.

In a survey of national AIDS programs carried out for the recent U.N. study of HIV/AIDS in the Pacific (United Nations 1996), Govind (1995) found that eight out of twelve programs reported HIV-testing facilities to be

TABLE 1. Number of AIDS Cases and HIV Infections Reported to the South Pacific Commission as of October 1997

Countries	AIDS Cases	HIV Cases (including AIDS)
Federated States of Micronesia	2	2
Fiji	7	38
French Polynesia	54	176
Guam	47	106
Kiribati	4	16
Marshall Islands	2	9
New Caledonia	56	145
Northern Mariana Islands	6	10
Palau	1	1
Papua New Guinea	?	745
Samoa	6	9
Solomon Islands	0	2
Tonga	6	9
Wallis and Futuna	1	2

Source: South Pacific Commission 1997.

inadequate. In at least one country, inadequate funding led to blood not being sent in for screening. In most, if not all, countries the stigma (and potential economic loss) attached to HIV/AIDS is great. In five of ten countries with HIV or AIDS cases, surveys of the national AIDS programs reported discrimination against infected persons as an issue of concern. In confidential interviews carried out by the authors with medical personnel and caregivers, persons living with HIV/AIDS were generally fearful of their infection becoming known. For similar reasons, death from AIDS is often reported as death from an HIV- or AIDS-related illness.

The degree of underreporting of HIV infections and AIDS cases in the Pacific is likely to be substantial. In a recent study of Papua New Guinea, Kault and Jenkins (1995) estimate that the actual number of HIV infections is two to ten times as large as the reported number.⁷ For AIDS cases in developing countries, the World Health Organization (1992) estimated that the actual number of cases of AIDS is about ten times the number of reported cases. Most estimates of actual cases range from three to ten times the number of reported cases (Ainsworth and Over 1994). Bloom and Mahal (1995) cite other studies, including a 1994 WHO study, that estimate the true number of HIV infections and AIDS cases to be 30 to 100 times the number of reported cases. Because of the many factors in the Pacific that would lead to underreporting and the fact that the epidemic is as yet at an

early stage there, a very conservative estimate would be that the number of cases is at least twice the number actually reported. More realistically, it may be ten or more times the reported number of cases.

Because of these factors, it is unclear what the current extent of HIV or AIDS is in the Pacific (Rakasetta 1995; United Nations 1996). The nations of the Pacific have many if not all of the risk factors that contribute to an HIV/AIDS epidemic: significant levels of unprotected pre- and extra-marital sex (Osuga and Chang 1994; Jenkins and PNG Sex and Reproductive Study Group 1994; James 1994; Ahlburg and Larson 1995); an established and growing sex industry (MacFarlane 1983; Plange 1990; Jenkins 1994); high levels of STDs (Sarda and Gallwey 1995; Finau 1995); injecting drug users in parts of Micronesia, New Caledonia, and French Polynesia; and areas where blood is not screened. In confidential interviews with medical and health care personnel and others involved in caring for persons with HIV/AIDS, little change in risk behaviors was reported even among individuals aware of the risk of HIV infection from sexual intercourse. If no behavioral change occurs in the Pacific, we believe that the potential exists for future seroprevalence rates on the order of 5 to 10 percent of the adult population in at least some countries. The potential is shown in the Marshall Islands syphilis outbreak, where 11.5 percent of the 20–24 age group and 6.3 percent of those aged 15–44 years were infected (Gershman et al. 1992). In comparison, most estimates for Africa suggest ultimate seroprevalence rates of from 10 to 20 percent (Bulatao 1991; Bongaarts 1994).

This potential appears to be becoming realized in at least some Pacific Island nations. In the two-year period between November 1995 and October 1997, the number of HIV infections reported increased dramatically. The number of infections rose from 342 to 745 in Papua New Guinea, from 28 to 38 in Fiji, from 144 to 176 in French Polynesia, from 6 to 9 in Tonga, from 2 to 9 in Samoa, from 77 to 106 in Guam, and from 2 to 16 in Kiribati (South Pacific Commission 1997). Some of the increase may be due to improved detection and reporting but much is probably real increase in new infections.

Crude death rates (CDRs) for several Pacific Island nations are shown in Table 2, along with the CDRs that would prevail if 5 percent of the population were infected and if 10 percent were infected. To illustrate the size of the impact, we also show the number of deaths that would occur in the year 2010 if current mortality rates prevailed and if 5 or 10 percent of the population were infected with HIV. This exercise illustrates the potential impact; it is not a prediction. In fact, in Papua New Guinea the number of AIDS deaths illustrated is not projected to occur until around 2020 (Kault and Jenkins 1995). Rakasetta believes that HIV infection rates will rise to 15 to 20

TABLE 2. **The Impact of an AIDS Epidemic on Mortality**^a

	Crude Death Rates			Deaths Around 2010		
	Current	With 5%	With 10%	No AIDS	Additional, with	
		HIV+	HIV+		5% Prevalence	10% Prevalence
Fiji	5	7.5	10	4,880	2,320	4,880
Kiribati	13	15.5	18	1,370	265	530
Marshall Islands	9	11.5	14	800	220	445
Papua New Guinea	12	14.5	17	71,150	14,820	29,645
Solomon Islands	8	10.5	13	4,670	1,460	2,920
Tonga	7	9.5	12	850	300	610
Vanuatu	9	11.5	14	2,230	620	1,240
Western Samoa	8	10.5	13	1,440	450	900

Sources: Crude death rates from South Pacific Commission 1994; population projections from Cole 1994 and for the Marshall Islands, W. House (pers. com., 1994).

^a Calculations based on the Bongaarts relationship between AIDS deaths and the seroprevalence rate.

per 100,000 by the year 2000 (1995:144). This is only two-tenths of 1 percent of the population. However, we think this figure is too low. Rakaseta notes that actual numbers of HIV infections and AIDS cases are generally 30 to 100 times higher than reported cases (1995:140–141). She also cites data from WHO that indicate that actual cases in Papua New Guinea are at least 30 times reported cases. Because of severe problems in diagnosis and reporting there, we believe that an appropriate adjustment to Rakaseta's figure is to multiply by 100. This brings Rakaseta's estimate to 2,000 per 100,000, or 2 percent of the population, not too far from our low estimate of 5 percent. Rakaseta believes that the incidence of infection will then stabilize as a "result of expanded AIDS/STD control programs" (1995:144). As yet, there is little sign of such an expansion.

Since many Pacific Island nations have been successful in reducing mortality to relatively low levels, an AIDS epidemic would substantially increase mortality rates and the number of deaths per year. For example, if 10 percent of Papua New Guinea's population were to become infected, the mortality rate would be 17 deaths per 1,000 population rather than 12, and there would be an additional 30,000 deaths in 2010, a 42 percent increase over the no-AIDS case. If 5 percent of the population of Western Samoa were to become infected, the mortality rate would increase from 8 deaths to 10.5 deaths per 1,000 and in 2010 an additional 450 people would die each year, a 30 percent increase. AIDS would become the leading cause of death among reproductive-age adults in the Pacific.

The Impact of AIDS on Population Growth

As noted above, estimates of mortality due to AIDS can be added to mortality from other causes and used as input to a cohort-component population projection model. Population projection models of this type are available for some Pacific Island nations, but not for all of them. So, to estimate the effect of AIDS on the rates of population growth, we again use an indirect method.

Stover (1993a, 1993b) estimated a linear relationship between the rate of population growth and the percentage of the population infected with HIV, for given incubation periods. He found that every sustained 10-percentage-point increase in the prevalence rate will reduce population growth between 0.6 percent a year (for a ten-year incubation period) to 1.0 percent per year (for a five-year incubation period). Thus the impact of a change in the sustained seroprevalence rate on the rate of population growth can be estimated if the incubation period is known.

This relationship is shown in Figure 1 for countries with a 2 percent and 3 percent annual rate of population growth, the rates common to most Pacific Island countries. For countries currently growing rapidly, at 3 percent per year (left axis), a sustained prevalence rate of 48 percent of the adult population is needed to bring population growth to a halt if the incubation period is ten years. If the incubation period is only five years, a 30 percent seroprevalence rate would halt population growth. For countries growing at a more modest, although still high rate of 2 percent per year (right axis), population growth stops if seroprevalence were 32 percent for a ten-year incubation period or 20 percent for an incubation period of five years. For countries like Tonga and Western Samoa whose populations are growing at around 1 percent per year, population growth would halt with a seroprevalence of 16 percent for a ten-year incubation and 10 percent for a five-year incubation.

Thus, if the incubation period for conversion of HIV to AIDS is short (five years), Pacific Island countries with low to moderate rates of population growth (1 to 2 percent per year) would see their populations cease to grow if 10 to 20 percent of the adult population were to become infected with HIV. If the incubation period is longer (ten years), rates of infection would have to be about 60 percent higher to halt population growth. For countries with rapidly growing populations, such as the Marshall Islands, extreme rates of seroprevalence would be needed to stop population growth. Such high rates have been observed in some groups in parts of Africa but are highly unlikely to be observed in Pacific populations. Since the incubation period is most likely to be close to ten years, the AIDS epidemic is unlikely to reverse population growth in the foreseeable future.

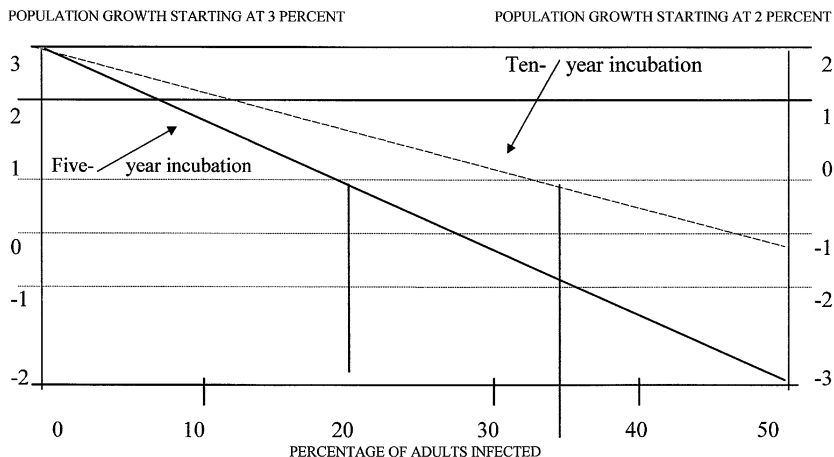


FIGURE 1. Impact of a sustained HIV infection rate on the population growth rate, assuming fertility and migration rates are unchanged by the HIV epidemic. (Ainsworth and Over 1994; derivation based on Stover 1993a, 1993b)

Not all countries will be affected equally since incidence of HIV/AIDS varies considerably in the Pacific. Nor, because of lack of surveillance systems and underreporting, can we say that countries that currently have low reported incidence will not suffer an epidemic. The degree of uncertainty is highlighted in the dramatic increases in reported cases between 1995 and 1997. What we are saying is that many countries have characteristics that pose a potential for an epidemic. The openness caused by internal and international migration makes it unlikely that Pacific Island countries can consider themselves safe from HIV/AIDS.

Conclusion

The number of HIV infections reported in Pacific Island nations is growing steadily. As yet the number of AIDS cases reported is relatively small, but it too is growing. If underreporting of HIV infections and AIDS is similar to that in other countries, the actual number of HIV infections and AIDS cases may be ten or more times the number reported. Since many, if not all, of the risk factors for HIV infection are present in the Pacific, without change in behaviors that place people at risk of infection the potential exists for seroprevalence rates on the order of 5 to 10 percent of the population. Such rates

of infection would considerably increase mortality and AIDS is likely to slow but not reverse population growth in many Pacific Island countries. Significant social and economic loss would likely accompany such an epidemic (see United Nations 1996). As yet, well-designed multisectoral responses to the threat of an HIV/AIDS epidemic are lacking in most Pacific Island countries. The longer such responses are delayed, the larger will be the epidemic and the greater its potential social and economic costs.

NOTES

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1. A paper by Ahlburg, Larson, and Brown (1995) covers the likely impact on the health sector and Duncan (1995) is a good introduction to the possible economic effects. All of these issues are also covered in the United Nations study.

2. It is not known whether the decision to become pregnant was a conscious decision nor whether the pregnancy occurred because the husband controlled reproductive decisions.

3. These estimates are based on calculations by Rakaseta but it is not stated if they are based on a projection model (Rakaseta 1995:144).

4. This relationship is derived from the application of a computer-simulation model. The model is based on a demographic framework augmented by a number of epidemiological submodels. A set of model simulations was carried out to determine the mortality impacts of different sizes of epidemic. The rule-of-thumb used in this article is based on the regularities observed in these simulations. It gives quite accurate results for a region but less accurate estimates for particular countries because of variation in epidemic size around the average. See Bongaarts 1994:201. The rule-of-thumb may be sensitive to the assumptions of the model and may be sensitive to the prevalence estimates used, although Bongaarts does not think that the estimates are seriously flawed (personal correspondence).

5. To refine this work one could specify a simulation model that reflected the Pacific experience and then run a set of simulations to make long-run projections of the annual incidence and the prevalence of HIV/AIDS, as well as the number of AIDS deaths. From such an exercise, one could obtain more accurate upper and lower bounds on the mortality impact of the AIDS epidemic in the Pacific.

6. Blood donors are not generally a good population-prevalence estimator when there are efforts to deter those with risk behavior from donating, especially when the prevalence rates are low and the population sizes are quite small, as is the case in most Pacific Island countries. Also, data sets on pregnant women are not widely available.

7. This estimate is based on the normal ratio of HIV-seropositive cases to AIDS cases reported in a population. They argue that even if all AIDS cases are reported (which is not the case; they are underreported), the number of HIV cases has been underreported by a factor of at least 2.

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