

Epidemiology Bulletin

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A Preliminary Estimate of HIV Infection and
Prevalence Rates in Taiwan

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Since the first AIDS case was identified in 1981, the number of cases has increased sharply in USA. To estimate the prevalence and incidence rates of AIDS and HIV is important. Methods of estimates are many, including the back-calculation and the extrapolation methods. All methods base their calculation on data of past observation or surveillance, and the estimate are adjusted from time to time. A review by US CDC estimates that there are currently around one million HIV carriers in USA, giving a prevalence rate of 4 per 1,000, and the number is increasing at about 42,000 persons per year, giving an annual incidence rate of 2 per 10,000. They vary by sex, geographical area, ethnic group, age and the degree of exposure to risky behavior.

Since 10 HIV cases were identified in Taiwan in 1984, there had been 80 cases by 1988. The authors did an estimate of prevalence rate then. The estimate was made against the risk groups only, and the estimate showed that the total number of carriers should be 4-9 times more than those identified. By December 1991, there had been a cumulative total of 245 HIV cases, of them 40 had developed into full-blown AIDS cases. The number, thought, had increased by three times in three years, any estimate based on these numbers only is already difficult, not to mention that the number of persons exposed to risks is uncertain. However, estimates are still necessary for the reference of the health authorities.

The major routes of infection of the HIV carriers in Taiwan are either through sexual behavior or contaminated blood. Of all risk groups, the homo/bi-sexuals through anal intercourse seem to be the majority. How many homosexuals are there in Taiwan? Historical, though there have been reports of homosexuality activity in Chinese literature, homosexuality is still not accepted by the society, the survey of it is difficult, and the estimate of its prevalence is more difficult. Estimate in USA based on Kinsey's report of 1948 and 1980 census gives 2 to 4% of the total population as homosexual. Are there that many homosexuals among Chinese population? The authors, based on personal observation of the number of places available for homosexuals, believe that the estimate of 0.24% by Dr Wen in 1980 based on the number of patients visiting his psychiatric clinic in three and a half years is more likely to reflect the prevalence of homosexuality among the population. After adjustment by sexual behavior and age, the number of homosexuals in Taiwan is estimated to be around 24,000. Of the homo/bi-sexuals examined, the posi-

tive rate has been around 2%. We, therefore, estimate that around 480 homosexuals are HIV carriers, ranging from 346 to 648 persons at 95% confidence interval.

Hemophilic patients may be infected by HIV through the use of anti-coagulant for the treatment of hemophilia. Before 1985, these blood products were made from blood contributed by homosexuals or IV drug abusers. They may have contained HIV and not heat treated. This route of infection has been prevented since 1985. Of the 565 hemophilic patients screened in Taiwan, 44 have been found to be infected, with a positive rate of 7.8%. In 1986, there were in Taiwan around 600 hemophilic patients, of them, 47 were estimated to be HIV carriers, ranging from 32-59 at 95% confidence interval.

IV drug abusers may be infected by HIV through repeatedly sharing needle and syringe contaminated by blood containing HIV. Of the 1,471 IV drug abusers, positive rate is 4%. It is difficult to estimate the numbers of drug abusers in Taiwan. The Justice Department's report says that each year around 1,500 abusers are forced to terminate their addiction. At 10 times of this figure, there could be around 15,000 IV drug abusers currently in Taiwan, of them, 60 are estimated to be HIV carriers ranging from 22-131 at 95% confidence interval.

Heterosexuals may be infected by HIV through sexual behaviors with prostitutes or promiscuous people. Only a few were reported in Taiwan at the earlier stage, soon, however, it became the third, and now, the second risk group. It could become the first risk group in two, three years later. Of the heterosexuals, STD patients have the highest risk. Of the 40,000 some STD patients screened, the positive rate is 0.1%. The number of STD patients in Taiwan is uncertain. The physical examination of military recruits gives a syphilis positive rate of 0.3%. For a population of 14 million (excluding children), there could be 40,000 syphilis patients. Together with patients of other STD's, the total number of STD patients could be around 10,000. Of them, 100 should be HIV carriers ranging from 72-135 at 95% confidence interval. Other heterosexuals, spouses, sex partners for instance, may also be infected by HIV carriers. Of the 3 million some blood samples tested by the Blood Donating Center, the positive rate is around 0.0009%. Some of them may be homosexuals, however. For a population of 14 million, the number of HIV carriers is estimated at 126 ranging from 87-178 at 95% confidence interval.

There are other routes of infection, e.g., the vertical transmission from mother to infant. Assuming the they occupy 10% of the above infections, there could be 81 HIV carriers through these routes. As shown in Table 1, the total number of HIV carriers is estimated to be about 894 ranging from 624 to 1,252 at 95% confidence interval. The prevalence rate of HIV in Taiwan, thus, is estimated to be 0.0045%, and the number of carriers is about 3.7% times of cases, ranging from 2.5 to 51. times at 95% confidence interval.

Incidence rate is obtained from cohort follow-up. Follow-ups of five ethnic groups in USA show the following incidence rates.

1. annual incidence of 0.0033% for persons donating blood twice at blood centers;
2. annual incidence of 0.06-0.08% for active-duty military personnel;
3. cohort follow-up of homosexuals gives an annual incidence of 1-3%;
4. annual incidence of 3-9% for IV drug abusers of New York City.

After weighing, the estimate is that 40,000 persons are infected each year. In addition, there are around 1,500-2,000 newborns infected at birth each year. The annual incidence of HIV infection in USA, thus is estimated to be around 0.02%.

No report on the cohort follow-up of serum change in Taiwan is available. Given prevalence rate=incidence rate X time period, the prevalence rate of USA is to be incidence rate by 20 years, then the incidence rate in Taiwan is estimated to be 0.00023% per year. That is, 46 persons are newly infected each year, ranging from 34 to 62 at 95% confidence interval.

It should be noted that the number of HIV infection in Taiwan, though, is increasing, is relatively small, estimation, therefore, is not easy. If it is estimated by the extrapolation method from the number of carriers already identified, the polynomial regression ($Y=a+bX^2$), which gives a good power of projection ($R^2 = 0.86$) (see Table 2), the estimate for the year 2000 gives a total number of 7,770 HIV carriers, ranging from 5,252 to 10,710 at 95% confidence interval. Of them, about 2,100 carriers could be identified through screening.

References:

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**Table 1. Estimation of HIV Prevalence Rate by Risk Groups*
(December 1991)**

Risk group	Estimated population	No. positive/No. examined for HIV (% positive)	Estimated No. of carrier	95% confidence interval
Homo/bi-sexuals	24,000	42/2307 (1.8%)	480	346-648
Hemophilics	600	44/565 (7.8%)	47	32-59
IV drug abusers	15,000	6/1471 (0.4%)	60	222-131
Heterosexuals (STD patients)	100,000	42/41666 (0.1%)	100	72-135
Heterosexuals (general population)	14,000,000	32/3647100(0.1%)	126	87-178
Others	10% of above		81	65-101
Total			894	624-1252

*Prevalence rate estimated to be 0.0045% (0.0031%-0.0063%, 95% CI)

Table 2. Estimation of HIV Incidence Rate from Past Reported Cases (December 1991)

Year	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993
Order	1	2	3	4	5	6	7	8	9	10
No. of carriers	10	16	10	12	35	45	40	90	93	114

* Incidence of past years is 0.00023% (0.00017%–0.00031%, 95%CI)

**Polynomial regression best fitted for projection ($Y=3.3+1.1X^2$, $R^2=0.86$).