

# EPIDEMIOLOGIC CHARACTERISTICS OF BLOOD DONORS WITH ANTIBODY TO HUMAN IMMUNODEFICIENCY VIRUS : THAILAND

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**Abstract.** Of 782,190 volunteer blood donors in Bangkok and nearby areas, who were screened for infection with human immunodeficiency virus type 1 (HIV-1) from January 1988 through December 1992, 3,219 tested positive on both enzyme immuno assay and Western blot assay. The identification variables of the donors were collected. The majority of HIV seropositive blood donors were male.

The average age (median) of HIV seropositive was 26-29 years all through 1988-1992. The prevalence of HIV seropositive in male donors was higher than that in females.

HIV seropositivity was confirmed in blood donations from first-time male donors in this study during 1988-1992. This rate has increased progressively from 0.87/1,000 in 1988 to 15.95/1,000 in 1992 with much higher rates in repeat donors. The repeat male donors increased from 0.77/1,000 in 1988 to 5.26/1,000 in 1991 and since then showed a decreased rate to 3.93/1,000 in 1992. Female donors were infected with HIV more frequently with the prevalence by sex ratio M : F rising from 27:1 in 1988 to 6.6:1 in 1992. Comparing the seropositive rate between first time and repeat female donors, the results showed an increase in rate from 0.11/1,000 in 1990 to 2.02/1,000 in 1992, but essentially the same rate in repeat donors.

A majority of HIV seropositive blood donors (1990-1992) lived in Bangkok (42-49%) and among those who lived in one eastern province (Samut Prakan), 90-93% lived in the industrial areas. Of those who lived in Chon Buri Province, 73-88% lived in Sattaheep District, which is naval base.

## INTRODUCTION

In Thailand, the first case of transfusion associated HIV infection from unscreened blood was found and known to the press in May 1985 (Wangroonsarb *et al*, 1985). Six out of 1,455 donated blood units collected in January 1987 from prison inmates by the National Blood Center (NBC) were found to be anti-HIV positive. This evidence led the NBC to start anti-HIV screening (ELISA) of all units of blood since September 24, 1987 (Nuchprayoon *et al*, 1990). Since then, the trend of HIV infection by screening test in general blood donors of the NBC was studied and the results showed that the prevalence in all donated blood and in all donors increased 2-3 times each year from 1988 to 1990, and increased 1.5 times in 1991 with a prevalence of 0.06% in 1988 rising to 0.60% in 1991 (Nuchprayoon *et al*, 1992).

The prevalence of HIV infection among blood donors in Thailand is also reported by the Division of Epidemiology, Ministry of Public Health; the prevalence rate is slightly higher than that of NBC (0.28 to 0.95%) in 1989 to 1992. The screening test

for anti-HIV on every unit of blood donated can effectively stop transfusion associated HIV infections (Rojanapithyakorn, 1992). We have gathered demographic and epidemiologic data from blood donors who have HIV antibody. This knowledge should be useful both in defining groups of people who need specific health education in preventing and in assessing the prevalence of HIV infection in the general population of Thailand.

## MATERIALS AND METHODS

The National Blood Center (NBC) Thai Red Cross Society, collected blood from persons in Bangkok and nearby areas, both at NBC and at mobile units from January 1988 through December 1992. Each donor was individually issued with an information card prior to donation. The identification of the donors by age, sex, occupation and home, or office address was recorded.

Routine screening tests on every unit of donated blood, before distribution, included ABO grouping,

RH, HBsAg, VDRL and anti-HIV. Anti-HIV was done by ELISA, particle gel agglutination and Western blot. The ELISA method used ELISA Wellcozyme HIV Recombinant (Wellcome Diagnostics, Dartford, England) and double antibody ELISA-Abbot Recombinant HIV 1/HIV 2 EIA (Abbot Diagnostic Division) methods.

ELISA test using Wellcozyme HIV Recombinant was done by manually dropping serum and conjugating substrate, whereas plate cleaning and result reading were done automatically. ELISA tests using Abbot Recombinant HIV 1/HIV 2 were done by automatic Parallel Processing Center (model Commander).

Particle gel agglutination was done by using Serodia solution (Kyowa), Tokyo and Western blot was done by using solutions produced by Dupont.

Result reading of Western blot was done according to the guidelines recommended by Centers for Disease Control, USA. Positive results were defined on condition that there were clear reactivities in two out of three of the following bands: p24, gp41, gp120/gp160.

Anti-HIV testing on donated blood began with ELISA solution as the initial screening. If the result

was positive, then the test was redone with the same solution in the form of duplicate tests. If the repeat test yielded a positive result, it was tested with another ELISA solution among with particle gel agglutination. If both tests were positive results, the confirmatory Western blot was performed.

Data on blood donors was recorded in an IBM S/38 computer. The computer program was set and developed by the Computer Institute, Chulalongkorn University and Professor Cazal, Regional Transfusion Center, Montpellier, France.

**Statistical analysis:** descriptive statistics were used in calculating HIV prevalence and in presenting data. Student's *t*-test of proportion was used for different prevalence rate.

## RESULTS

The majority of HIV seropositive blood donors were male (> 93%) (Table 1). The average (median) age of seropositivity was 26-29 years. Female donors showed increasing rates of HIV infection, the sex ratio M:F rising from 82:1 in 1988 to 14:1 in 1992.

Table 1  
Selected characteristics of HIV seropositively blood donors.

Characteristics	1988	1989	1990	1991	1992
Total donors	137,213	137,563	139,208	167,221	170,985
No. HIV seropositive	86	257	676	1,069	1,131
Age (years)					
Median	29.2	26.7	27.1	26.8	26.6
Sex (%): Male	98.8	98.4	97.8	96.7	93.3
Female	1.2	1.6	2.2	3.3	6.7
Sex ratio Male : Female	82:1	62:1	44:1	29:1	14:1
<b>Occupation (%)</b>					
Students	7.8	0.8	5.5	8.0	4.8
Government officials + state enterprises	4.3	4.3	30.6	18.0	26.9
Employees	6.5	4.3	16.3	18.0	13.3
Monks	5.2	0.8	3.8	3.2	2.1
General*	58.4	89.9	43.8	52.8	52.9
Total	100.0	100.0	100.0	100.0	100.0

\*Own business, unemployed, housewives (for female)

The prevalence of HIV seropositive in first time male donors was 0.87/1,000 in 1988 and strikingly increased each year to 15.95/1,000 in 1992. The first time female donors revealed an increasing prevalence rate over time from 0.0/1,000 in 1988 to 2.02/1,000 in 1992. The prevalence rate in repeat female donors showed a slow increase during the past five years from 0.07/1,000 to 0.71/1,000 (Table 2).

A majority of HIV seropositive blood donors (1990-1992) lived in Bangkok (42-49%) (Table 3). The second and third provincial areas were Chon Buri and Samut Prakan. The other provincial areas were provinces that are close to Bangkok.

Those HIV seropositive blood donors who lived in Bangkok were found to have their residential areas

Table 2  
HIV seropositive in blood donors by sex and types of donors (rate/1,000).

Donors	1988	1989	1990	1991	1992
<b>Male</b>					
Total donors	104,924	102,765	103,035	119,689	119,545
First time	0.87	3.99	9.97*	13.37*	15.95*
Repeat	0.77	1.57	4.19	5.26	3.93
Total	0.81	2.46	6.42	8.64	8.88
<b>Female</b>					
Total donors	32,289	34,788	36,173	47,532	51,440
First time	0.0	0.17	0.11	0.94	2.02*
Repeat	0.07	0.06	0.65	0.52	0.71
Total	0.03	0.11	0.41	0.74	1.34
All donors	0.63	1.87	4.86	6.39	6.61

\*Statistically significant difference at = 0.05

Table 3  
Residential areas of HIV seropositive blood donors (1990-1992).

City	1990		1991		1992	
	No.	%	No.	%	No.	%
Bangkok	313	46.3	522	48.8	471	41.6
Chon Buri	138	20.4	148	13.8	290	25.6
Samut Prakan	57	8.4	80	7.5	86	7.6
Nonthaburi	28	4.1	36	3.4	34	3.0
Pathum Thani	16	2.4	39	3.7	32	2.8
Kanchanaburi	17	2.5	40	3.7	30	2.7
Lop Buri	17	2.5	19	1.8	14	1.2
Samut Sakhon	7	1.0	14	1.3	11	1.0
Prachuap Khiri Khan	2	0.3	2	0.2	24	2.1
Chanthaburi	6	0.9	15	1.4	5	0.4
Others	75	11.1	154	14.4	134	11.9
Total	676	100.0	1,069	100.0	1,131	100.0

HIV IN BLOOD DONORS

in Phra Khanong, Bang Khen and Phaya Thai Districts (8-12%) during 1990-1992, and the remaining nine districts comprised less than 8%. The HIV seropositive blood donors who lived in Samut Prakan Province were found to have their residential area in Muang District (39-48%). The second rank residential areas were Bang Phli and Phra Pradaeng Districts. Finally, of the majority of HIV seropositive blood donors who had residential areas in Chon Buri, 73-88% were found to live in Sattahip District (Table 4).

Fig 1 shows that the prevalence of HIV seropositivity in male donors was higher than in females with a striking increase over time. The seropositive rate in males showed a plateau since 1991 while in females a low rate of increase was observed. Female donors were infected with HIV more frequently, with a sex ratio M:F 27:1 in 1988 rising to 6.6:1 in 1992.

New male donors showed an increasing trend of HIV infection over time, with a much higher rate than repeat donors (Fig 2). Repeat male donors revealed a slightly increased rate from 1988 to 1991, but since then showed a decreased rate from 1991 to 1992.

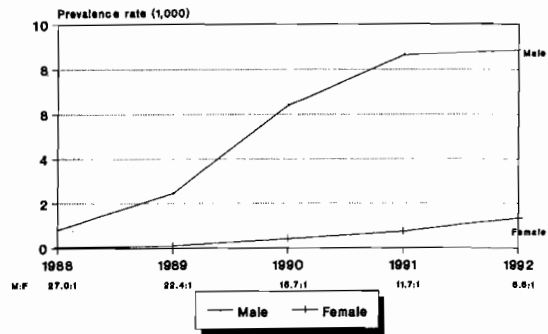


Fig 1-HIV seropositivity in all blood donors. By sex : 1988-1992.

Comparing the seropositive rate between new and repeat donors, the graph showed rapidly increased rate from 1990 to 1992 in new donors with more or less the same rate in repeat donors (Fig 3). However, in 1990 repeat donors had a higher rate than new donors.

Table 4  
Residential areas of HIV seropositivity blood donors (1990-1992).

Residential areas	1990		1991		1992	
	No.	%	No.	%	No.	%
Bangkok	313	100.0	522	100.0	471	100.0
Districts:						
Phra Khanong	30	9.6	51	9.8	37	7.9
Bang Khen	25	8.0	50	9.6	55	11.7
Phaya Thai	28	9.0	47	9.0	45	9.6
Others - (9 districts)	83	73.4	374	71.6	334	70.9
Outside Bangkok						
Provinces:						
Samut Prakan	57	100.0	80	100.0	86	100.0
Districts:						
Muang	22	38.6	38	47.5	37	43.0
Bang Phli	19	33.3	22	27.5	24	27.9
Phra Pradaeng	12	21.1	14	17.5	16	18.6
Others	4	7.0	6	7.6	9	10.5
Chon Buri	138	100.0	148	100.0	290	100.0
Districts:						
Sattahip	100	72.5	113	76.4	254	87.6
Others	38	27.5	35	23.6	36	12.4

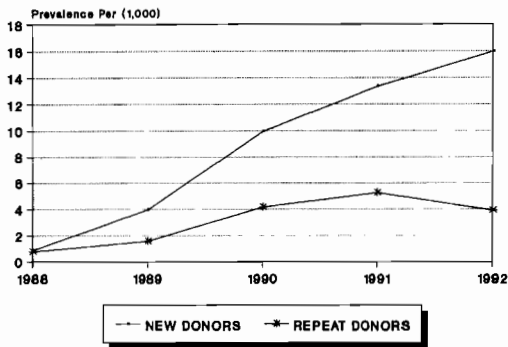


Fig 2—HIV in new male and repeat male donors : 1988-1992.

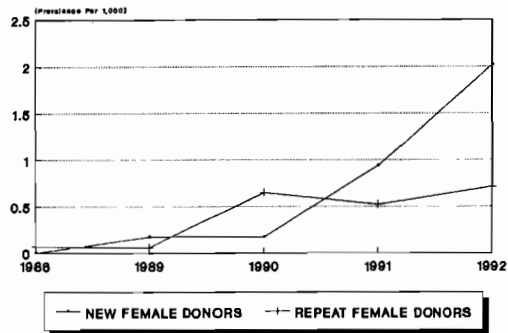


Fig 3—HIV in new female and repeat female donors : 1988-1992.

## DISCUSSION

Blood donors at the National Blood Center are people from all walks of life in Bangkok and nearby provinces. HIV infection in blood donors was detected via the screening test performed on every unit of donated blood to ensure the maximal safety. Since the number of donors increased every year from 137,213 in 1988 to 170,985 in 1992, the anti-HIV screening process can be considered as one performed en masse. The result can reflect the status of HIV infection in the population in Bangkok and nearby provinces. According to the report of the Division of Epidemiology (1993), Ministry of Public Health, HIV infection in pregnant women was 1% whereas those in other high risk groups, *ie* drug addicts and prostitutes, were 36.4% and 23.9%, respectively. The prevalence of HIV infection in blood donors of the National Blood Center during 1988-1992 increased from 0.06% to 0.19%,

0.49%, 0.64% and 0.66%, respectively. HIV infection was found in male more than in female donors at the ratio of 27.0:1 (1988) and 6.1:1 (1992) (Fig 1). Both the results of this study and the report of the Division of Epidemiology (1993) support the alarming fact that HIV infection has already spread to the family circle. During the past five years, HIV infection was found in younger-age groups whose median age is 26-29 years old while 30% of the donors were 20 to 29 years of age in three major blood centers in the United States (Ward *et al*, 1988). Also it was clear that the vast majority of HIV-1 seropositive donors in Greece belonged to the 20 to 30 years age group (Hatzidimitrion *et al*, 1991). Most of them are first time male donors whose main reason for donating blood is to have their blood tested for HIV and it is considered that this reason is one of the important risk factors, of which the relative risk was 4.43 (2.48-7.79) and was statistically significant (Nuchprayoon *et al*, personal communication). Despite the predonation counselling program, there are still donors who want to have their blood tested for this reason. This was evidenced by the fact that first time male donors had a higher HIV infection rate from 0.87/1,000 (1988) to 15.95/1,000 (1992) (Table 2). Though HIV infection in total male donors increased every year during the past five years, the rate increased only slightly from 8.64/1,000 in 1991 to 8.88/1,000 in 1992 because the HIV infection rate in repeat male donors decreased during 1991-1992.

To conclude, new male and female donors tend to have higher HIV infection rates whereas in repeat male donors, the trend of HIV infection decreased in 1992. In repeat female donors, the trend increased slightly in 1992. Most HIV infected donors (46-49%) live in Bangkok. They donate blood at the National Blood Center as well as at mobile units. In Chon Buri Province, Sattahip district has the second highest infection rate. This is because the National Blood Center mobile team goes out to collect blood at the Kletkeow military base (Sattahip district) every year. According to Nuchprayoon *et al* (1992) the prevalence of HIV infection in military recruit blood donors, Sattahip district was 3.19%. The third was Samut Prakan Province, of which the highest rates were found in Muang, Bang Pli and Phra Pradaeng districts, respectively. All are industrial areas where many donors work in companies and factories. The mobile team regularly goes out to collect blood in these areas. Other districts are mostly agricultural areas.

In Bangkok, 8-12% of HIV infected donors live in Phra Khanong, Bang Khen and Phaya Thai where there are more than 200,000 population (209,461, 221,274 and 201,261 people in 1990-1992 respectively) (Population statistics and number households in Bangkok, 1993). A lot of people living in these areas come to donate blood because they live in the vicinity of the National Blood Centre.

The results of this study, when compared with those from countries in Europe and America, showed much higher prevalence rates. In 1990, the HIV prevalence of blood donations in Spain (0.19/1,000) was similar to that of France (0.10/1,000). Greece (0.14/1,000) and Portugal (0.62/1,000). Also in 1991, the average prevalence of blood donations for the WHO European Region was 0.18/1,000 (European Center for the Epidemiological Monitoring of AIDS, 1992). The present data showed much higher prevalence rate than American blood donors (0.5/1,000) (Ward *et al*, 1988). Although the acquired immunodeficiency syndrome (AIDS) has been thought to have originated in Africa, the reports of prevalence of human immunodeficiency virus antibodies in northern Nigeria blood donors was 2% among healthy adult male blood donors. This may be due to underdiagnosis, and or lack of suitable diagnostic facilities (Kulkarni *et al*, 1987). The present study showed a lower prevalence rates than that in Nigeria.

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