

## Rising Trends of STIs and HIV Infection in Singapore – A Review of Epidemiology Over the last 10 Years (1994 to 2003)

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### Abstract

**Introduction:** This is a review of the epidemiology and trends of sexually transmitted infections (STIs) in Singapore from 1994 to 2003. **Materials and Methods:** Data collated for both notifiable and non-notifiable STIs from 1994 to 2003 were analysed. This data consisted of STI notifications from medical practitioners in Singapore as well as from the Department of STI Control clinic itself. **Results:** There was a decline in the overall STI incidence in Singapore in the first half of the last decade from 215 cases per 100,000 population (7200 cases) in 1994 to 162 cases per 100,000 population (6318 cases) in 1999, followed by an increasing trend in the number of acute STIs (both bacterial and viral) over the past 5 years to 195 cases per 100,000 population (8175 cases) in 2003 ( $P < 0.001$ ). The incidence of HIV has risen sharply over the last decade whilst that of other viral STIs has not decreased. Singaporeans are becoming sexually active at a younger age, with casual partners constituting the main primary contacts. **Conclusions:** Although there has been a significant decline in the overall incidence of STIs in Singapore over the last decade, a rise in acute STIs over the last 5 years has resulted in the need to identify the causal factors, and to intensify existing as well as develop new STI/HIV prevention programmes for the general population and certain core groups.

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**Key words:** Genital herpes, Gonorrhoea, Sex workers, STI/HIV, Syphilis

### Introduction

A review of the epidemiology and trends of sexually transmitted infections (STIs) in Singapore from 1977 to 1996 showed a declining number of all STIs notified in Singapore from 22,427 in 1978 to 5570 in 1996, with the 20-to-29 years age group consistently accounting for the highest proportion of STIs.<sup>1</sup> There was a progressive decline in the incidence of bacterial STIs over those 20 years, with viral STIs remaining at a relatively constant level. The number of visits to the Department of STI Control (DSC) clinic has increased by 25% over the last decade to over 20,000 a year. There has been a substantial increase in DSC clinic attendance since the year 2000, resulting in a sharp rise in workload. The increasing demand for STI services may be attributed to an increasing incidence of infections, increased public awareness of STIs, and increasing patient expectations as well as an improved level of services available at the newly renovated clinic site.

This paper reviews the trends of STIs in Singapore over the last 10 years, from 1994 to 2003. It is important to monitor trends in STIs in order to implement effective policies as well as health education and prevention programmes.

### Materials and Methods

This study looks at the data collated from STI notifications in Singapore from 1994 to 2003. The Infectious Disease Act in Singapore stipulates that the following STIs are notifiable: syphilis (all stages), gonorrhoea, non-gonococcal urethritis (NGU), chancroid, lymphogranuloma venereum, granuloma inguinale, genital herpes, human immunodeficiency virus (HIV) infection and acquired immunodeficiency syndrome (AIDS). The DSC in Kelantan Road was set up in 1991 and is run by the National Skin Centre for the Ministry of Health. The DSC collates STI notifications from medical practitioners in Singapore and

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from the DSC clinic itself. We also looked at data regarding non-notifiable STIs such as genital warts and vaginal discharges (moniliasis, trichomoniasis, chlamydia cervicitis), which were largely data from the DSC clinic and may not be entirely representative of the general population. Both doctors and health advisors at the initial consult at the DSC clinic obtained information on primary contacts and gave patients contact slips to be passed to their primary contacts to enable them to come to the clinic for investigation and treatment. In order to elucidate the source of infections, we looked at the primary contacts of patients presenting with acute STIs from 2001 to 2003.

The Medical Surveillance Scheme (MSS), introduced in 1976, is a disease control programme for sex workers with the objectives of providing infection screening and treatment of STIs, and providing preventive educational programmes. Currently, sex workers are required to undergo monthly cervical tests for gonorrhoea and chlamydia and three-monthly serological tests for syphilis and HIV. Screening for hepatitis B was started in 1995. All non-immune registrants are immunised against hepatitis B.

The MSS is administered by the DSC, which has been analysing the effectiveness of the programme in controlling STIs/HIV among sex workers since 1976. Sex workers can be divided into 3 groups: MSS (old), which comprises existing sex workers; MSS (new), which comprises sex workers applying to join the scheme (most of whom were already in the trade); and anti-vice (AV) arrestees consisting of sex workers who were arrested for prostitution.

## Results

### Trends of STI

Figure 1 shows the initial decline in the overall STI incidence in Singapore from 215 cases per 100,000 population (7200 cases) in 1994 and subsequent rise to 195 cases per 100,000 population (8175 cases) in 2003. The incidence of STIs initially decreased in the first half of the last 10 years, but there has been an increasing trend in the

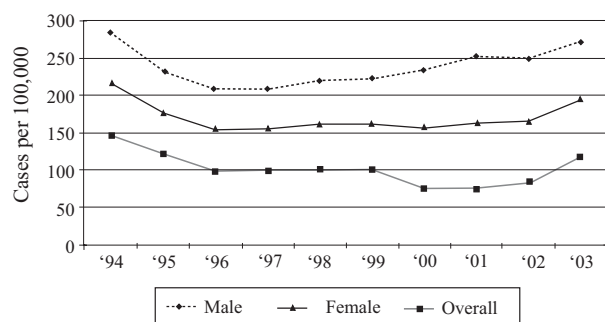


Fig. 1. Incidence rate of all STIs by sex in Singapore, 1994 to 2003.

incidence of acute STIs over the past 5 years. The incidence of STIs was 162 cases per 100,000 population (6318 cases) in 1999, compared to 195 cases per 100,000 population (8175 cases) in 2003 ( $P < 0.001$ ). The increase in the incidence of gonorrhoea, infectious syphilis, non-gonococcal urethritis (NGU), chlamydia cervicitis, genital herpes and genital warts accounted largely for this increasing trend over the last 5 years.

Previous reports<sup>1</sup> documented a steady decline in the incidence of gonorrhoea in Singapore from 15,098 cases notified in 1978 to 1419 cases in 1996. However, the data shows a turnaround, with a stepwise rising trend, from 1997 to 2003. The incidence of gonorrhoea rose from 36.31 cases per 100,000 population in 1997 to 48.77 cases per 100,000 population in 2003 ( $P < 0.05$ ).

The incidence of infectious syphilis fell dramatically from 345 cases in 1978 to 126 cases in 1996. There appears to be a resurgence of infectious syphilis in Singapore, with a rising trend over the last 5 years from 3.08 cases in 1999 (120 cases), to 5.07 cases per 100,000 population in 2003 (212 cases) ( $P < 0.001$ ).

There has been a sharp upward trend in the incidence of NGU over the last 5 years. Prior to 1999, there was a steady gradual decline in the incidence of NGU in Singapore. However, 1194 cases were notified in 1999 and this rose to 1933 cases in 2003.

Vaginal discharges (moniliasis, trichomoniasis) and chlamydial cervicitis have also shown a steep upward trend over the last 5 years. The incidence of chlamydial cervicitis rose from 302 cases in 1999 to 516 cases in 2003.

Viral STIs have also contributed to the increase in the number of acute STIs over the last 5 years. There was an initial decline in the incidence of genital herpes from 700 cases in 1993 to 429 cases in 1996. However, over the last 5 years, there has once again been a dramatic increase in its incidence. The number of cases rose from 536 in 1999 to 932 in 2003.

A similar pattern is seen in the incidence of genital warts. There was an initial decline in the incidence of genital warts from 561 cases in 1993 to 379 cases in 1996. However, over the last 5 years, there has been an increase in this incidence, with the number of cases rising from 624 in 1999 to 791 in 2003.

Figure 2 shows the proportion of STI incidence by age group amongst Singaporeans. The highest proportion of STIs notified has consistently been in the 20-to-29 years age group. However, there has been an increasing incidence of STIs in the 10-to-19 years age group in recent years. Figure 3 shows the incidence of infections amongst the 10-to-19 years age group from 1995 to 2003. There were 241 cases of STIs notified in 1995, compared to 371 cases

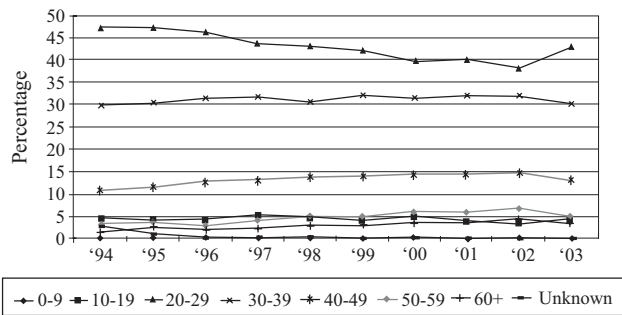


Fig. 2. Percentage incidence of all STIs by age group in Singapore, 1994 to 2003.

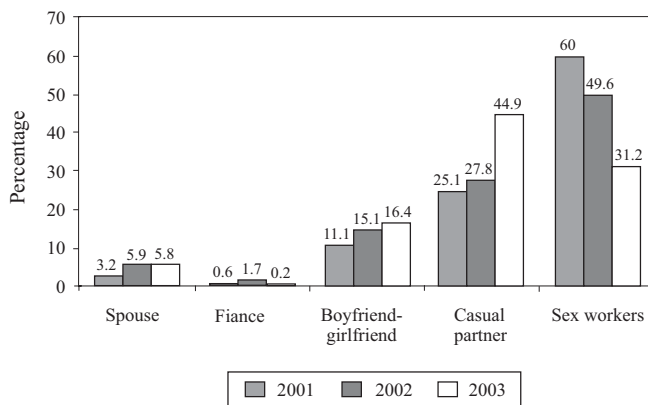


Fig. 4. Primary contacts of patients with gonorrhoea, 2001 to 2003.

notified in 2003. The incidence of STIs in females within the 10-to-19 years age group based on the type of STIs diagnosed shows an increase in the incidence of acute STIs such as chlamydial cervicitis, genital warts, genital herpes, gonorrhoea and candidiasis. The incidence of STIs in males within the 10- to-19 years age group has shown an increase in the incidence of gonorrhoea and NGU.

Sources of Infection

Figure 4 shows the primary contacts of patients presenting with gonorrhoea. In 2001, sex workers constituted the highest proportion (60%) of primary contacts of patients. Casual partners (25.1%) and boyfriends/girlfriends (11.1%) were the other main contacts of patients presenting with gonorrhoea in 2001. However, by 2003, the profile of primary contacts had reversed. Sex workers as primary contacts had halved to 31.2% while casual partners had almost doubled to 44.9%, with boyfriends/girlfriends increasing to 16.4%.

A similar pattern is seen for NGU. In 2001, sex workers constituted the highest proportion (53.8%) of primary contacts of patients. Casual partners (25.7%) and boyfriends/girlfriends (15.5%) were the other main contacts of patients

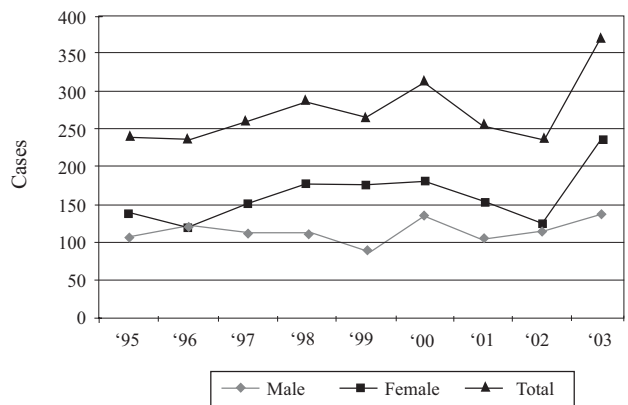


Fig. 3. STI incidence – 10-to-19 years age group by sex in Singapore, 1995 to 2003.

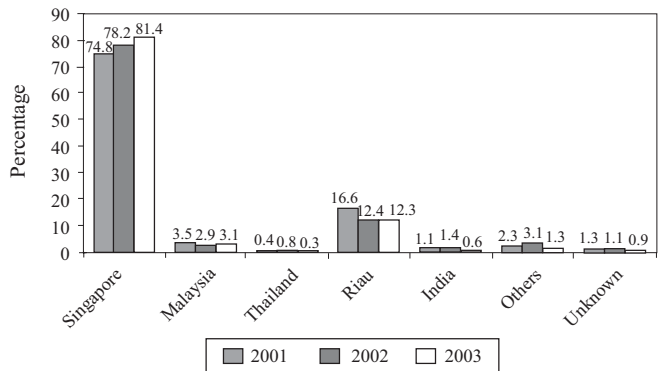


Fig. 5. Country of primary contacts of patients with gonorrhoea, 2001 to 2003.

presenting with NGU in 2001. However, by 2003, the profile of primary contacts had once again reversed. Sex workers as primary contacts had almost halved to 29.3% while casual partners had almost doubled to 36.2%, with boyfriends/girlfriends increasing to 23.8%.

The primary contact pattern is similar for infectious syphilis. In 2001, sex workers constituted the highest proportion (53.6%) of primary contacts of patients. Casual partners (33.3%) and boyfriends/girlfriends (11.6%) were the other main contacts of patients presenting with gonorrhoea in 2001. However, in 2003, the profile of primary contacts had once again reversed. Sex workers as primary contacts had halved to 31.2% while casual partners had increased to 44.0%, with boyfriends/girlfriends relationships increasing to 18.4%.

Figure 5 shows the primary contact of patients with gonorrhoea acquired outside Singapore. The results show that the Riau Peninsula, which is situated next to Singapore and a popular travel destination for the sex trade, contributed a significant contact population for

Table 1. Number of Singaporeans Reported with HIV/AIDS, 1994 to 2003<sup>2</sup>

Sex	Year									
	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003
Male	76	102	123	157	167	171	193	204	206	212
Female	10	9	16	16	32	35	33	33	28	30
Total	86	111	139	173	199	206	226	237	234	242
Rate per million population	29	36.8	45.3	55.4	62.7	63.9	69.3	71.4	69.3	70.4

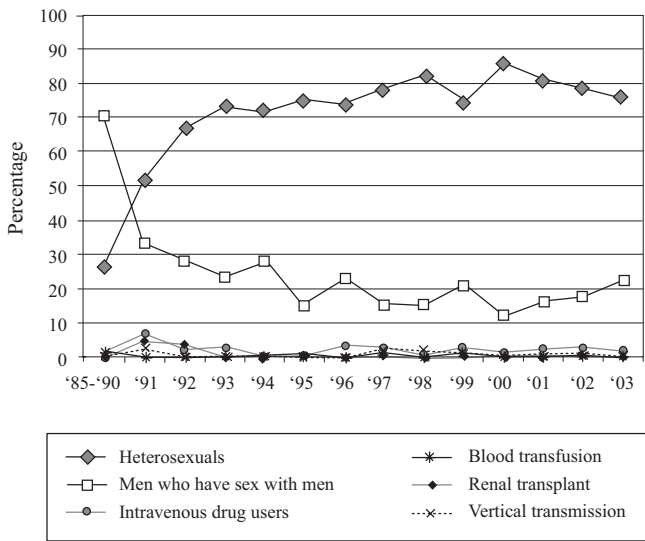


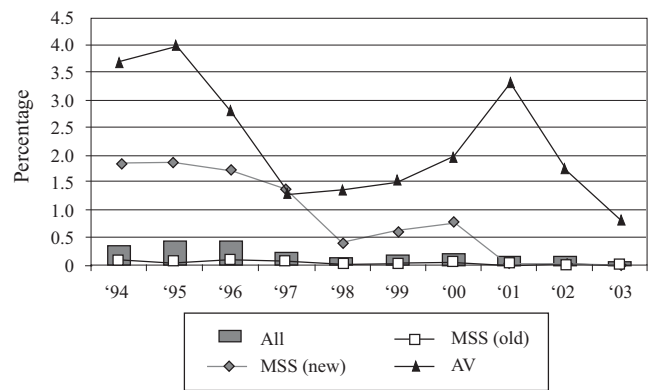
Fig. 6. Distribution of HIV-infected Singaporeans by modes of transmission, 1985 to 2003.

Singaporeans with STIs. This was also true for NGU and infectious syphilis.

*Trends of HIV Infection*

The incidence of HIV infection in Singapore rose sharply over the last decade. Table 1 shows the incidence of HIV infection and the incidence of AIDS amongst Singaporeans from 1994 to 2003. In 1994, 86 cases of HIV were diagnosed, and this tripled to 242 cases in 2003. This means that the population-based infection rate increased from 29 cases per million population in 1994 to 70.4 cases per million population in 2003.

Figure 6 shows the distribution of HIV-infected Singaporeans by modes of transmission from 1985 to 2002. It can be seen that sex between heterosexuals and men who have sex with men (MSM) were the main modes of transmission of HIV infection in Singapore. Ninety-five per cent of HIV infection in Singapore was sexually transmitted, with the majority having been acquired through heterosexual sex. However, there has been a considerable



AV: anti-vice; MSS: Medical Surveillance Scheme

Fig. 7. HIV in female sex workers in Singapore, 1994 to 2003.

increase in transmission through homosexual contact (MSM) over the last few years.

*Sex Workers*

The incidence of cervical gonorrhoea infection was lowest among the MSS (old) group and the highest in the AV group. Infection rates for pharyngeal gonorrhoea in sex workers from 1994 to 2003 were generally low in all 3 groups. The cervical chlamydia infection rate in sex workers from 1994 to 2003 showed a significant decline in all 3 groups of sex workers, with the lowest rates amongst the MSS (old) group and the highest rates amongst the AV group. There was a sharp decline in syphilis infection rates over the last decade, especially in the MSS (new) and AV groups.

Figure 7 shows the HIV infection rate in sex workers from 1994 to 2003. The highest rates of infection were found in the AV group, and in 2003, no cases of HIV infection were detected in the MSS old and new groups.

**Discussion**

In the first half of the last decade, there was a decline in the incidence of STIs and HIV infection in Singapore. It is likely that this can be largely attributed to the National STI

and AIDS Control Programmes. However, there have not been any randomised clinical trials to prove the efficacy of these programmes in STI/HIV control. These programmes provide the public with accurate and timely information about sexual health risks through health education and prevention programmes. Education programmes are also targeted at youths, MSM (in collaboration with the NGO Action for AIDS), foreign workers, prisoners and other organisations. The DSC clinic provides open-access, affordable STI diagnosis and treatment services. Its public education and awareness campaigns on STI/HIV have resulted in patients seeking treatment early, increasing the demand for services at the DSC clinic.

The major problem identified by the National STI control programme at present is the significant and increasing trend in the number of acute STIs over the last 5 years. This includes both bacterial and viral STIs. Several factors may account for the increase, such as increased public awareness of STIs, which may have resulted in an increased patient load and thus increased case detection.

The finding that Singaporeans are becoming sexually active at a younger age and inadequate education on STIs for youths, may account for the sharp rise in STI incidence amongst adolescents and young people. School-based programmes dealing with sexuality should be taught to school-going adolescents as well. In 2000, the Ministry of Education launched a new programme, "Growing Years", which addresses issues surrounding sexuality for school-going youth. The DSC has also introduced several programmes, including the provision of a bilingual website<sup>3</sup> designed to reach out to young people. The DSC also distributes educational information on postcards and other information, education and communication (IEC) materials that contain information on the above website, telephone counselling numbers and where to seek further counselling and consultation. Programmes have been conducted with welfare homes for young persons and the Ministry for Community Development and Sports to provide information to staff and adolescents.

We looked at sexual behaviour patterns and knowledge to attempt to find the basis for the rising trend in acute STIs. Results from the Global Sex Survey Report undertaken by Durex<sup>4</sup> showed that the average global age for first sex is now 17.7 and demonstrated a trend towards losing one's virginity earlier, with today's 16- to 20-year-olds becoming sexually active by the average age of 16.5 years. The survey revealed that the average age at which Singaporeans first had sex was higher than that of their peers in other countries, at 18.9 years. The age at which Singaporeans first received sex education was 14.0 years whilst that in Germany was 11.3 years. The majority of Singaporeans felt that parents/guardians, as well as schools, should be the principle

teachers of sex education. In terms of risky sex behaviour, 39% of Singaporeans had unprotected sex.

In general, young people in Singapore take a conservative standpoint regarding sexual behaviour. A survey conducted by Clores et al<sup>5</sup> from 1998 to 1999 on 11- to 21-year-old Singaporeans found that only 38.5% had dated before, and only 14% identified themselves to be permissive with regard to sexual attitude. Three in 4 disapproved of premarital sex, even between 2 individuals who were in love, although this figure fell to 52% if both had plans to marry. Of concern was the fact that only about 1 in 2 sexually active adolescents used barrier protection against conception and STIs and 67% were not using oral contraception despite the fact that they showed a good knowledge of pregnancy prevention. This was consistent with a study conducted in 1994 by Ball and Moselle,<sup>6</sup> which found that despite their conservative attitudes towards sexuality, there had been a rise in the number of unwanted pregnancies and abortions amongst teenagers in Singapore. A recent review by Chan and Tan<sup>7</sup> on STIs in Singaporean teenagers looked at the trends of STIs in adolescents from 1997 to 2001. This showed a slow but steady decline in the proportion of STIs diagnosed in the 10-to-19 years age group; from 9% of all notifications in 1978 to 7.3% in 1988 and 4.6% in 1998.

While most STIs occur in the younger age groups, older individuals are not exempt. A study conducted from January 1996 to December 2000 looked at the distribution and types of STIs in older persons (50 years or older) in Singapore.<sup>8</sup> This showed that the STI notification for persons aged 50 years and older accounted for 7.6% of all notifications, with males being predominantly affected. The 4 most common STIs in the older population were gonorrhoea, syphilis, genital herpes and NGU.

Behavioural patterns are also changing. Our findings show that the primary contacts of patients presenting with acute STIs has changed from sex workers to casual partners. There appears to be a movement away from paid sex to casual sex. We are currently evaluating where these casual relationships are being sought in order to identify and educate this cohort of sexually active individuals.

The results also show that a significant minority of acute STIs continue to be acquired overseas. There is an important sex industry in the neighbouring Riau Islands. Rates of HIV infection in this Indonesian province are among the highest in the region.<sup>9</sup> This holiday destination accounts for a significant number of cases of acute STI infections. Programmes to address this problem have been organised, for example, condoms are currently given in free travel packs that also contain information leaflets on STIs/HIV.

The National STI and AIDS Control Programmes have

resulted in Singapore possessing one of the lowest STI and HIV infection rates in Asia. The MSS is a good example of an effective targeted programme as it focuses on a high-risk group. Education of sex workers in the MSS has been developed and implemented in Project Protect I (1992), II (1995) and Expanded Project Protect (1996 to date). These projects involve educational lectures and video presentations, programmes on developing sex workers' negotiating skills regarding the usage of condoms, and the promotion of condom use.

In order to reach out to part-time sex workers in the entertainment industry, Project Masseur I, II and III (1993, 1998, and 2003), Project Bar Nightclub and Lounge (1995-1996) and Project Streetwalkers (1997, 1998) were conducted. Both establishment owners as well as the target groups were invited to the DSC clinic for talks on STIs and HIV, and free confidential serological tests for syphilis and HIV were offered to them.

In 1996, Expanded Project Protect, which introduced the condom promotion programme for oral sex, was incorporated into the programme<sup>10</sup> as a result of the marked rise in oral sex arising as an unintended effect of a successful condom programme for vaginal sex.<sup>11</sup> All newly registered brothel-based sex workers in Singapore are required to attend 4 training sessions at the DSC clinic (on registration, 1 week, 6 months and 1 year after registration). The programme consists of teaching skills on condom usage negotiation and safer sex behaviours using video presentations, comic books, role-playing, group discussions and self-monitoring of condom negotiation success rates, with the eventual aim of achieving and sustaining 100% condom use among sex workers.

These intervention programmes have resulted in consistent condom use for more than 90% for vaginal and oral sex, with corresponding declines in the incidence of cervical and pharyngeal gonorrhoea incidence in female brothel-based sex workers in Singapore.<sup>10,11</sup> However, the rise in pharyngeal gonorrhoea from 2002 to 2003 in sex workers reinforces the need for continuous education and implementation in this core group. In 2003, there was a sharp rise in cervical chlamydia infection rates amongst all 3 groups of sex workers. This can be attributed to the introduction of polymerase chain reaction (PCR) methodology for testing for chlamydia in place of the less sensitive enzyme-linked immunosorbent assay (ELISA) method.

Our results also show that since the implementation of the MSS in 1976, brothel-based sex workers have had extremely low rates of STI and HIV infection and those sex workers who were reported as contacts of patients with acute STIs were freelancers and indirect sex workers or were located overseas. The fact that the old MSS registrants

have the lowest infection rates of all 3 groups of sex workers, demonstrates that the MSS is effective in reducing STIs in sex workers. This is supported by the zero HIV infection rate in the MSS old registrants in 2002 and 2003. This underlines the urgent need to target non-brothel-based sex workers who have higher rates of STI and HIV infection and males who have sex with sex workers overseas.

Viral STIs have not decreased over the last decade. This may continue until more effective and affordable antiviral drugs and vaccinations become available. Until this time, we will have to rely largely on prevention campaigns and individual counselling to control viral STIs.

Between 4000 and 5000 people are estimated to be infected with HIV in Singapore<sup>12</sup> and approximately half of them remain undiagnosed. Ninety per cent of HIV infection detected among Singaporeans and residents were in males, with the majority of infections having been acquired through heterosexual sex. Most of these infections are thought to have been acquired overseas, particularly by heterosexual men who have sex with sex workers, although locally transmitted infections certainly occur. Of particular concern is the considerable increasing transmission of HIV through homosexual contact. Targeted prevention and education programmes for MSM are organised by Action for AIDS.

The prevalence of HIV infection among adults (ages 15 to 49 years) in Singapore is 0.2%; this is lower than that found in surrounding countries such as Malaysia (0.4%), India (0.8%), Thailand (1.8%) and Cambodia (2.7%). However, it is higher than the prevalence of HIV in countries such as Australia (<0.2%), Japan (<0.2%) and Sri Lanka (<0.1%). The prevalence of HIV infection in Singapore is equivalent to that found in the United Kingdom (0.2%), but lower than that found in the United States (0.6%). The relatively low HIV prevalence in Singapore may be the result of active targeted health promotion, particularly for sex workers and their clients, the presence of an open-access STI clinic with an effective STI control programme, universal screening of blood donations and careful surveillance and analysis of trends of STIs and HIV infection. However, there is a rapidly increasing HIV epidemic in Asia, and with the large numbers of people travelling for work or pleasure, there will be more mingling and more sexual contact. Travel and sex tourism will continue to play a major role in the pattern and magnitude of STIs and HIV infection in Singapore.

In conclusion, although there has been a significant decline in the overall incidence of STIs in Singapore over the last decade, there has been a rise in acute STIs over the last 5 years. This has resulted in the need to identify the causal factors, and to intensify existing, as well as develop new STI/HIV prevention programmes for the general

population, and certain core groups. Research results must be used to plan, implement and evaluate STI/HIV prevention programmes. The full range of channels available should be utilised for disseminating information. This will require collaboration and coordination with other organisations (both governmental and non-governmental, health and non-health).

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