

Air-/Droplet-
Borne
Diseases

Vector-Borne/
Zoonotic
Diseases

Food-/Water-
Borne
Diseases

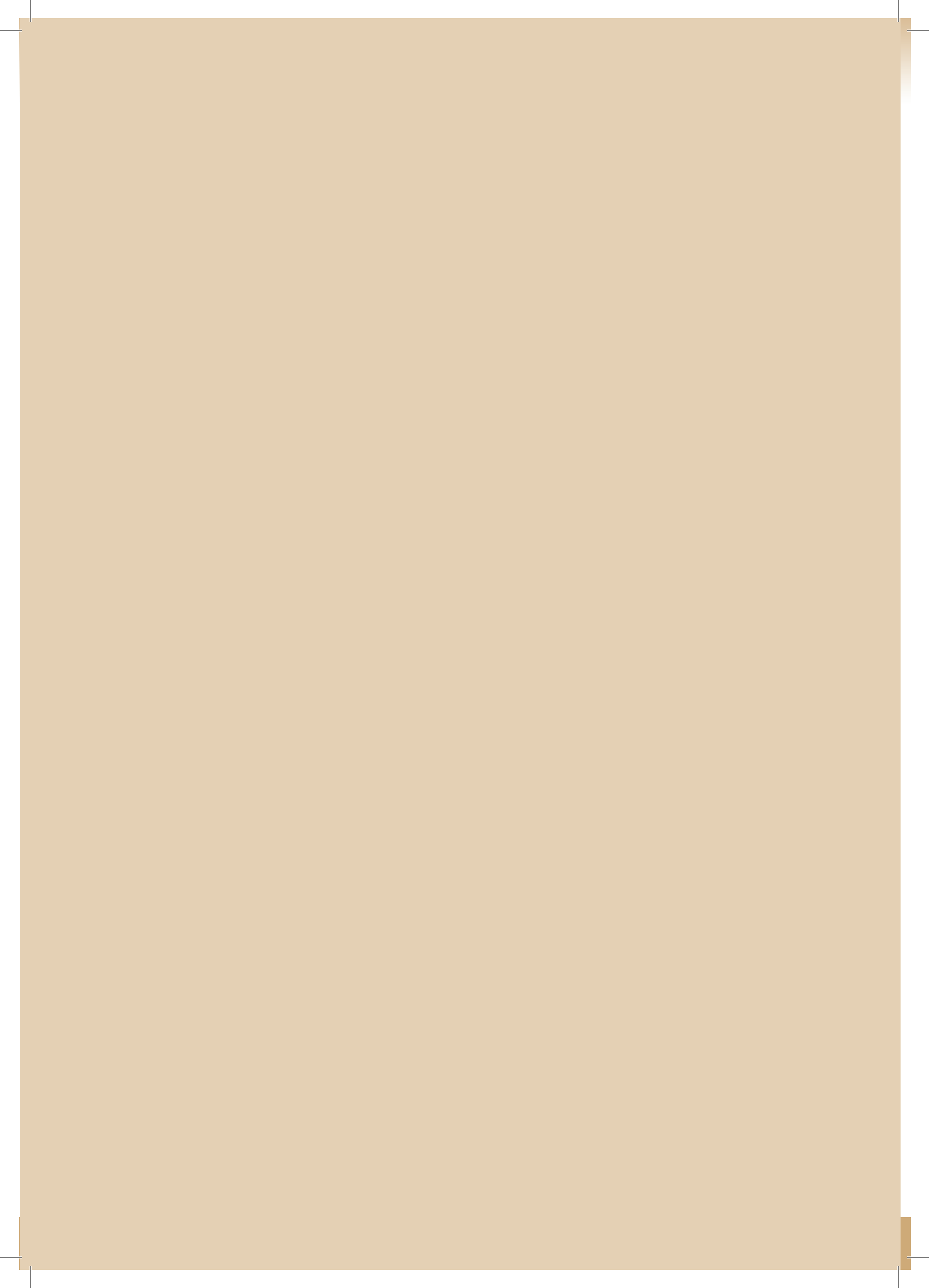
Blood-Borne
Diseases

Environment-
Related
Diseases

HIV/AIDS, STIs,
Tuberculosis
& Leprosy

Childhood
Immunisation

- Human Immunodeficiency Virus Infection and Acquired Immunodeficiency Syndrome
- Sexually Transmitted Infections
- Tuberculosis
- Leprosy



VI HIV/AIDS, STIs, TUBERCULOSIS & LEPROSY

HUMAN IMMUNODEFICIENCY VIRUS INFECTION AND ACQUIRED IMMUNODEFICIENCY SYNDROME

Human immunodeficiency virus (HIV) belongs to the lentivirus group of the retrovirus family. HIV, the cause of the Acquired Immunodeficiency Syndrome (AIDS), continues to spread and has caused over 25 million deaths worldwide.

HIV can be transmitted from person to person through unprotected sexual intercourse, the use of HIV contaminated needles including the sharing of needles among intravenous drug users, transfusion of infected blood or blood products, mucosal exposures with infected body fluid and the transplantation of HIV-infected tissues or organs. Mother-to-child or vertical transmission is the most common route of HIV infection in children.

The majority of people with HIV infection are asymptomatic for a median time of 10 years from infection to development of AIDS, although the length of time varies between individuals.

A total of 423 Singapore residents with HIV infection were reported in 2007, an increase of 18% from 357 cases in

2006 (Table 6.1). This brings the cumulative total number of HIV/AIDS infections among residents since the first case was diagnosed in 1985 to 3,483. During 2007, 158 cases of AIDS were reported (Table 6.2), including 97 with AIDS at diagnosis of HIV infection and 61 previously diagnosed asymptomatic HIV-infected patients who progressed to AIDS in 2007. These 97 cases with AIDS at diagnosis comprised 23% of the new cases in 2007. This was an improvement over the proportion in earlier years, when the proportion that had AIDS at diagnosis formed about 40% to 50% of new cases each year. However, the proportion of patients presenting with late-stage¹ HIV infection remained similar to 2006 (52% in 2007 compared to 58% in 2006).

The incidence rate of reported HIV/AIDS in 2007 was 118.1 per million population, an 17% increase from 101.3 per million population in 2006 (Figure 6.1). The AIDS morbidity rate increased to 44.1 per million population in 2007, from 35.7 per million population in 2006. In 2007, 96 deaths in HIV/AIDS patients were reported, giving a mortality rate of 26.8 per million population.

Table 6.1
Distribution of Singapore residents with HIV/AIDS by gender, 1985 – 2007

Year	Male	Female	Total	No. of cases per million population*
1985	2	0	2	0.8
1986	6	1	7	2.8
1987	10	0	10	3.9
1988	15	0	15	5.8
1989	9	1	10	3.8
1990	17	0	17	6.2
1991	39	3	42	15.0
1992	49	6	55	19.3
1993	58	6	64	22.0
1994	76	10	86	29.1
1995	102	9	111	36.8
1996	123	16	139	45.3
1997	157	16	173	55.4
1998	167	32	199	62.6
1999	171	35	206	63.8
2000	193	33	226	69.0
2001	204	33	237	71.3

¹ As defined by CD4+ cell count of less than 200 per cu mm or AIDS-defining opportunistic infections or both.

Table 6.1 (Cont'd)
Distribution of Singapore residents with HIV/AIDS by gender, 1985 – 2007

Year	Male	Female	Total	No. of cases per million population*
2002	206	28	234	69.2
2003	212	30	242	71.9
2004	290	21	311	91.1
2005	287	30	317	91.4
2006	325	32	357	101.3
2007	392	31	423	118.1
Total	3,110	373	3,483	-

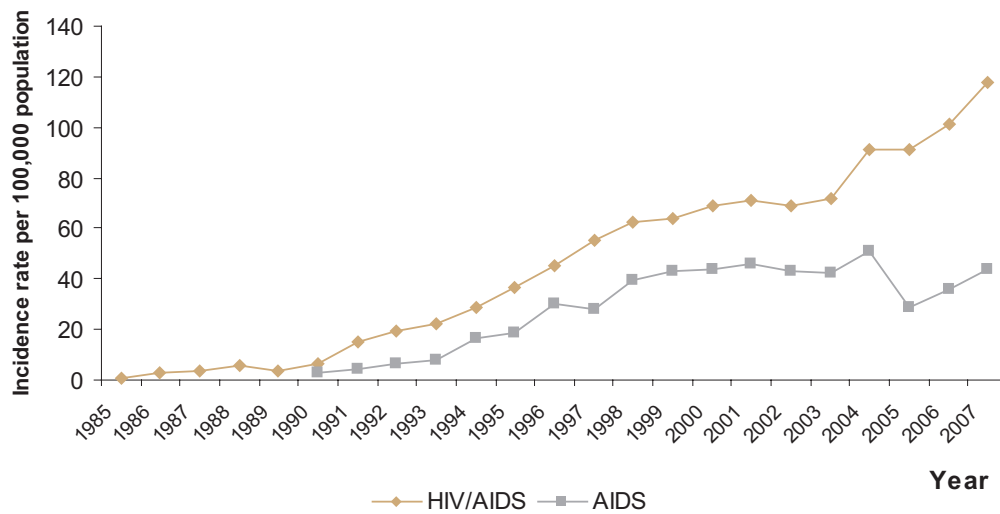
* per million population, based on yearly resident population estimates revised by Singapore Department of Statistics in February 2008.

Table 6.2
Distribution of Singapore residents with AIDS by gender, 1985 – 2007

Year	Male	Female	Total	No. of cases per million population*
1985	0	0	0	0.0
1986	1	0	1	0.4
1987	3	0	3	1.2
1988	6	0	6	2.3
1989	5	0	5	1.9
1990	8	0	8	2.9
1991	12	0	12	4.3
1992	17	1	18	6.3
1993	19	3	22	7.6
1994	44	4	48	16.2
1995	51	5	56	18.6
1996	89	3	92	30.0
1997	80	8	88	28.2
1998	112	13	125	39.3
1999	125	15	140	43.3
2000	128	15	143	43.7
2001	136	16	152	45.7
2002	133	13	146	43.2
2003	130	13	143	42.5
2004	162	11	173	50.7
2005	91	9	100	28.8
2006	117	9	126	35.7
2007	152	6	158	44.1
Total	1,621	144	1,765	-

* per million population, based on yearly resident population estimates revised by Singapore Department of Statistics in February 2008.

Figure 6.1
Incidence rate of reported HIV/AIDS among Singapore residents, 1985 – 2007



Distribution by age and gender

The majority of HIV/AIDS cases were between 20 and 49 years and were predominantly male. The male to female ratio was 8:1. More than half (56.7%) of all new cases reported in 2007 were between 30 – 49 years of age, and about one-eighth (55 cases) were between 20 – 29 years

of age. The highest proportion of HIV/AIDS cases was in the age group 40 – 49 years for both genders in 2007, and constituted 30.9% in males and 41.9% in females (Table 6.3).

Table 6.3
Age-gender distribution of Singapore residents with HIV/AIDS, 1985 – 2007

Age group	1985 – 2000	2001	2002	2003	2004	2005	2006	2007
Male								
0 – 9	6	2	1	1	1	0	2	1
10 – 19	9	0	0	1	4	4	1	6
20 – 29	233	17	22	22	41	36	50	54
30 – 39	496	61	53	71	82	85	91	99
40 – 49	273	61	67	66	84	83	90	121
50 – 59	95	34	39	29	44	49	60	81
60 & above	82	29	24	22	34	30	31	30
Female								
0 – 9	7	0	1	0	2	3	1	1
10 – 19	2	1	1	0	0	0	1	3
20 – 29	71	10	10	7	6	8	7	1
30 – 39	47	6	3	12	7	10	8	7
40 – 49	21	7	6	8	5	1	7	13
50 – 59	13	4	6	3	0	7	6	6
60 & above	7	5	1	0	1	1	2	0
Total								
0 – 9	13	2	2	1	3	3	3	2
10 – 19	11	1	1	1	4	4	2	9
20 – 29	304	27	32	29	47	44	57	55
30 – 39	543	67	56	83	89	95	99	106
40 – 49	294	68	73	74	89	84	97	134
50 – 59	108	38	45	32	44	56	66	87
60 & above	89	34	25	22	35	31	33	30

Biographic profile of HIV/AIDS patients

Among the males, 60.1% were single at the point of diagnosis. For the females, however, the majority (60.3%) were married (Table 6.4). Among all new cases in 2007,

55.8% were single, while 31.0% were married, 11.6% were divorced/separated and 1.6% were widowed at the time of diagnosis.

Table 6.4
Distribution of Singapore residents with HIV/AIDS by marital status, 1985 – 2007

Marital Status	1985 – 2000	2001	2002	2003	2004	2005	2006	2007
Male								
Single	758	110	106	112	180	176	198	230
Married	316	60	71	65	74	82	92	114
Divorced/Separated	93	26	25	28	25	27	30	42
Widowed	27	8	4	7	11	2	5	6
Female								
Single	36	4	6	3	7	7	8	6
Married	111	17	15	21	8	19	17	17
Divorced/Separated	13	6	3	5	2	3	6	7
Widowed	8	6	4	1	4	1	1	1
Total								
Single	794	114	112	115	187	183	206	236
Married	427	77	86	86	82	101	109	131
Divorced/Separated	106	32	28	33	27	30	36	49
Widowed	35	14	8	8	15	3	6	7

Mode of HIV/AIDS transmission

The main mode of HIV transmission among the 3,483 cases was through sexual contact, representing 94.6% of cases in 2007 (Table 6.5). Heterosexual transmission accounted for 60.3% of all cases in 2007 while homosexual and bisexual transmission accounted for 34.3%. The number of cases infected via intravenous drug use had

halved from 14 cases in 2006 to 7 cases in 2007. There were two children who were infected through the perinatal route, bringing the total number infected through the perinatal route to 29 since 1985. There was one case infected through blood transfusion overseas in 2007.

Table 6.5
Distribution of Singapore residents with HIV infection by mode of transmission, 1985 – 2007

Mode of Transmission	1985 – 2000	2001	2002	2003	2004	2005	2006	2007
Sexual orientation								
Heterosexual	979	181	181	177	188	185	222	255
Homosexual	169	22	30	40	72	87	94	130
Bisexual	130	16	12	14	22	14	14	15
Intravenous drug use	26	6	6	4	7	4	14	7
Blood transfusion	3	0	0	0	0	0	0	1
Renal transplant overseas	5	0	0	0	0	0	0	0
Perinatal (mother to child)	13	2	2	1	4	3	2	2
Uncertain	37	10	3	6	18	24	11	13
Total	1,362	237	234	242	311	317	357	423

SEXUALLY TRANSMITTED INFECTIONS

Sexually transmitted infections (STIs) are infections caused by different pathogens (e.g., bacteria, viruses, parasites, fungi) which are spread from person to person primarily through sexual contact. The common and important STIs are caused by *Treponema pallidum* (Syphilis), *Neisseria gonorrhoeae*, *Chlamydia trachomatis* (infection of the urethra, cervix, pharynx and rectum), herpes simplex virus – types 1 and 2 (anogenital herpes), human papilloma virus (anogenital warts), *Trichomonas vaginalis* (infection of the urethra and vagina) and human immunodeficiency virus (HIV) infection.

The diagnosis of an STI is a “sentinel” event which indicates unprotected sexual activity and therefore, patients presenting with one STI are at increased risk of acquisition of others. The presence of STIs can increase the risk of acquisition of HIV infection and also promote its transmission. Sexually transmissible pathogens are also implicated in other reproductive system problems such as pelvic inflammatory disease (PID), infertility and ectopic pregnancy.

Disease trend

In 2007, the overall incidence for STIs was 251 per 100,000 population. This rate had increased sharply from 199 per 100,000 population in 2003 to 257 per 100,000 population in 2004, and subsequently rose slightly to 259

per 100,000 population in 2005 before dipping to 251 per 100,000 population in 2007 (Figure 6.2). The three main bacterial STIs notified were gonorrhoea, non-gonococcal urethritis (NGU) and syphilis (Figure 6.3).

Figure 6.2
Incidence rate of STIs, 1980 – 2007

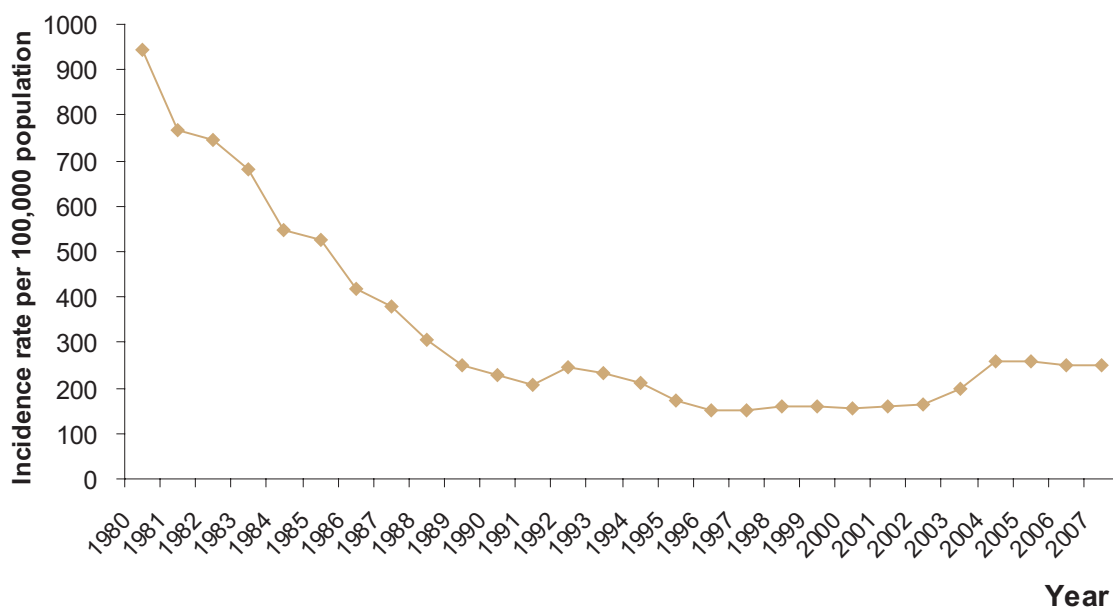
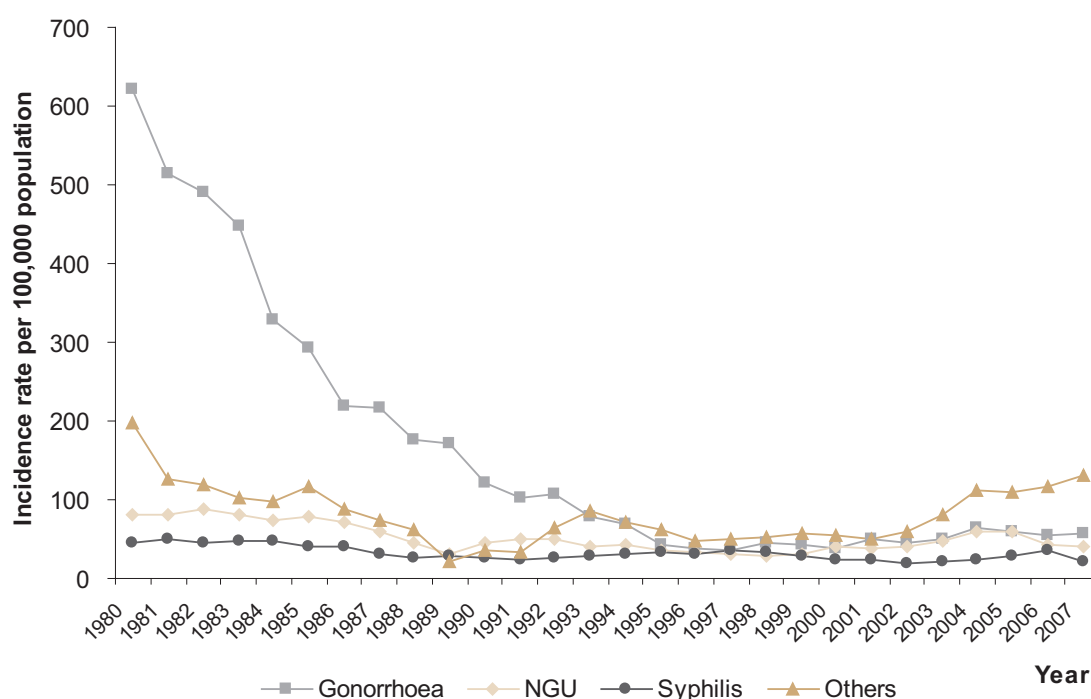


Figure 6.3
Incidence rate of STIs by type, 1980 – 2007



Distribution by age and gender

The male to female ratio was 2:1. As in previous years, the age-specific incidence rate for STIs among females was highest in the age group 20 – 24 years. Among the

males, the highest age-specific incidence rate was in the age group 25 – 29 years. The overall rate was highest in the 20 – 24 year age group (Tables 6.6 and 6.7).

Table 6.6
Distribution of STIs incidence rates by type and gender, 2007

Type of STI	Incidence rate per 100,000 population		
	Male	Female	Total
Gonorrhoea	89.0	21.2	56.0
NGU	80.0	0.0	41.1
Syphilis	30.8	12.9	22.1
Other STIs:			
Vaginal Discharge	0.0	56.7	27.6
Genital Herpes	34.1	19.9	27.2
Genital Warts	40.6	8.0	24.7
Chlamydia	33.2	56.9	44.7
Chancroid	0.7	0.1	0.4
Others	9.0	5.6	7.3
All types	317.3	181.2	251.1

* Rates are based on 2007 estimated mid-year population.
(Source: Singapore Department of Statistics)

Table 6.7
Age-gender distribution of STIs incidence rates, 2007

Age (Yrs)	Incidence rate per 100,000 population*		
	Male	Female	Total
0 – 9	2.1	0.5	1.3
10 – 14	0.7	19.0	9.5
15 – 19	184.4	340.4	259.0
20 – 24	493.8	583.1	536.1
25 – 29	591.7	417.9	506.9
30 – 34	573.9	259.1	427.7
35 – 39	482.5	172.0	340.8
40 – 44	362.8	107.2	243.9
45 – 49	261.6	81.2	174.5
50 – 54	234.3	40.9	138.3
55 – 59	199.8	27.7	111.7
60 +	123.3	24.8	69.1
Total	317.3	181.2	251.1

* Rates are based on 2007 estimated mid-year population.
(Source: Singapore Department of Statistics)

Syphilis

The incidence rate of syphilis was 22 per 100,000 population in 2007, which was a 39% increase from 2006. From a historical perspective, the incidence rate of syphilis decreased from 45 per 100,000 population in 1980 to 23 per 100,000 population in 1991. From 1992, there was an increase in the incidence rate from 26 per 100,000 population to 36 per 100,000 population in 1997. Subsequently it declined to 18 per 100,000 population in 2002 before increasing to 36 per 100,000 population in 2006.

The rate of infectious syphilis declined progressively from 18 per 100,000 population in 1986 to 3 per 100,000 population in 1999. It then increased to 5 per 100,000 population in 2004 and remained stable at 4 per 100,000 population from 2005 to 2007. There was one case of congenital syphilis reported in 2007.

Gonorrhoea

The incidence rate of gonorrhoea was 56 per 100,000 population in 2007, a 2% increase from the 2006 rate of 55 per 100,000 population. One case of gonococcal ophthalmia neonatorum was reported in 2007.

The prevalence of penicillinase-producing *Neisseria gonorrhoeae* (PPNG) was 52.1% in 2007, which was a slight increase from 48.5% in 2006 (Table 6.8). The incidence of *Neisseria gonorrhoeae* resistant to Ciprofloxacin increased from 61.9% in 2006 to 76.3% in 2007 (Table 6.9).

Table 6.8
Gonorrhoea cultures screened for PPNG, 1980 – 2007

Year	No. of cultures	PPNG cases	
		No.	(%)
1980	8,318	2,462	29.6
1985	3,789	1,316	34.7
1990	2,323	766	33.0
1991	1,894	686	36.2
1992	1,755	622	35.4
1993	1,300	489	37.6
1994	1,046	530	50.7
1995	642	315	49.1
1996	721	383	53.1
1997	722	438	60.7
1998	804	451	56.1
1999	797	413	51.8
2000	651	359	55.1
2001	936	482	51.5
2002	929	462	49.7
2003	200	89	44.5
2004	1,549	699	45.1
2005	1,499	735	49.0
2006	1,347	653	48.5
2007	1,424	742	52.1

Table 6.9
Gonorrhoea cultures screened for resistance to ciprofloxacin, 1998 – 2007

Year	No. of cultures	Ciprofloxacin resistant cases	
		No.	(%)
1998	768	55	7.2
1999	768	131	17.1
2000	635	121	19.1
2001	741	207	27.9
2002	200	93	46.5
2003	200	103	51.5
2004	160	80	50.0
2005	160	95	59.4
2006	160	99	61.9
2007	160	122	76.3

Non-gonococcal urethritis (NGU)

The incidence rate of NGU was 41 per 100,000 population in 2007. This was a slight decrease of about 2% from 42

per 100,000 population in 2006.

Other STIs

The incidence of other STIs, comprising mainly genital discharge, genital herpes, genital warts, genital candidiasis, chancroid and trichomoniasis was 132 per 100,000 population in 2007. It was 111 per 100,000 population in 2005, and increased to 117 per 100,000 population in

2006. The incidence of genital herpes has risen steeply in recent years, from 13 per 100,000 in 2001 to 28 per 100,000 population in 2004, followed by a slight drop to 25 per 100,000 population in 2006. The incidence of genital herpes then increased by 8% to 27 per 100,000 in 2007.

TUBERCULOSIS

Tuberculosis (TB) is a mycobacterial disease that is a major cause of death and disability in most parts of the world especially in developing countries. Initial tuberculosis infection usually goes unnoticed, a condition

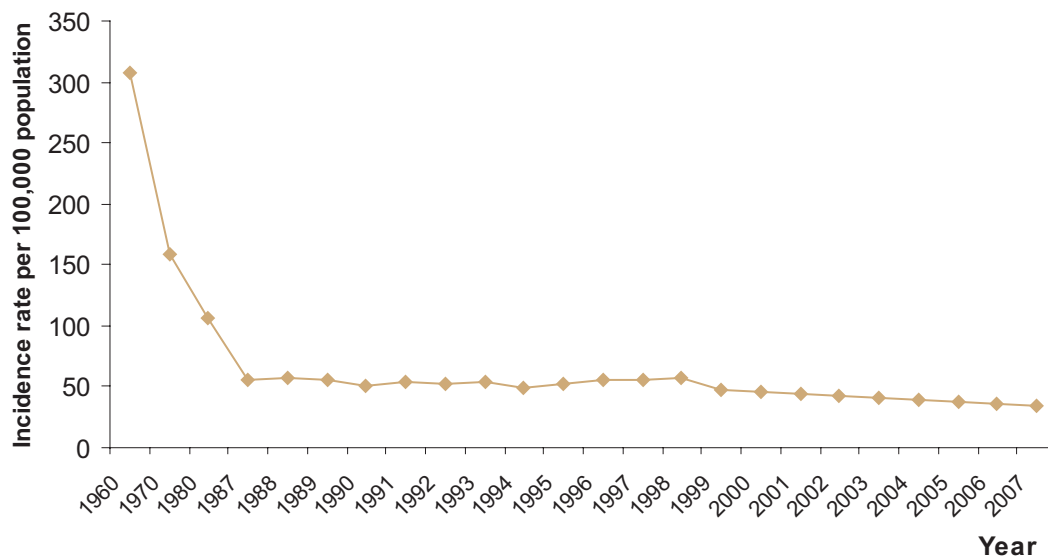
known as latent TB infection (LTBI). About 10% of them initially infected will eventually develop active disease, half of them in the first two years following infection.

Incidence and site of disease

The incidence rate of TB was 35.1 per 100,000 population in 2007. From a historical perspective, the incidence rate of TB declined from 307 per 100,000 population in 1960 to 56 per 100,000 in 1987. From 1987 to 1998, the incidence rate of new TB cases among Singapore

citizens and permanent residents stagnated around 50-55 per 100,000 population. After that, the incidence rate continued to decline again from 57 per 100,000 population in 1998 to 35.6 per 100,000 in 2006 and its current rate of 35.1 per 100,000 in 2007 (Figure 6.4).

Figure 6.4
Incidence rate of tuberculosis among Singapore residents, 1960 – 2007



There were 1,256 new cases of TB among Singapore residents notified in 2007. The majority (85.5%) of cases had pulmonary TB, while the remainder (14.5%) had exclusively extrapulmonary TB (Table 6.10). The most common site of extrapulmonary TB in males was

the pleura (68 new cases in 2007); and in females, the lymphatic system was the most common extrapulmonary site affected (49 new cases in 2007). There was no case of tuberculosis meningitis reported among Singapore residents below 15 years of age.

Table 6.10
Distribution of Singapore residents with tuberculosis by site of disease, 1960 – 2007

Year	New Cases			Incidence rate per 100,000 population			Index (base 1960)
	Pulmonary ¹	Extra pulmonary	Total	Pulmonary ¹	Extra pulmonary	Total	
1960	4,985	72	5,057	303	4.0	307.0	100.0
1970	3,135	157	3,292	151	8.0	159.0	51.8
1980	2,253	164	2,417	99	7.0	106.0	34.5
1987	1,346	92	1,438	52.7	3.6	56.3	18.3
1988	1,374	104	1,478	52.9	4.0	56.9	18.5
1989	1,350	102	1,452	51.0	3.9	54.8	17.9
1990	1,243	123	1,366	45.4	4.5	49.9	16.3
1991	1,410	121	1,531	50.5	4.3	54.8	17.9
1992	1,380	130	1,510	48.4	4.6	53.0	17.3
1993	1,471	105	1,576	50.6	3.6	54.3	17.7
1994	1,322	112	1,434	44.7	3.8	48.5	15.8
1995	1,448	116	1,564	48.1	3.8	51.9	16.9
1996	1,591	105	1,696	51.9	3.4	55.3	18.0
1997	1,577	135	1,712	50.5	4.3	54.8	17.9
1998	1,655	155	1,810	52.0	4.9	56.9	18.5
1999	1,405	138	1,543	43.5	4.3	47.8	15.6
2000	1,359	159	1,518	41.5	4.9	46.4	15.1
2001	1,278	196	1,474	38.4	5.9	44.3	14.4
2002	1,271	154	1,425	37.6	4.6	42.1	13.7
2003	1,230	173	1,403	36.5	5.1	41.7	13.6
2004	1,176	184	1,360	34.5	5.4	39.8	13.0
2005	1,142	174	1,316	32.9	5.0	37.9	12.4
2006	1,071	185	1,256	30.4	5.2	35.6	11.6
2007	1,074	182	1,256	30.0	5.1	35.1	11.4

¹ Pulmonary TB means TB of the lung parenchyma and includes cases that have both pulmonary and extrapulmonary tuberculosis.

Distribution by age and gender

As in previous years, tuberculosis continued to be a disease of older males (Table 6.11). Of the 1,256 new cases notified among Singapore residents in 2007, 697

(55.5%) were 50 years old and above, and 851(67.8%) were males.

Table 6.11
Age-gender distribution and incidence rates of reported tuberculosis among Singapore residents, 2007

Age (Yrs)	Male	Female	Total (%)	Incidence rate per 100,000 population*		
				Male	Female	Total
0 – 4	3	4	7 (0.6)	3.0	4.2	3.6
5 – 9	0	3	3 (0.2)	0.0	2.7	1.3
10 – 14	0	2	2 (0.2)	0.0	1.6	0.8
15 – 19	22	21	43 (3.4)	16.7	16.7	16.7
20 – 29	70	65	135 (10.7)	30.1	27.0	28.5
30 – 39	83	59	142 (11.3)	28.7	19.2	23.8
40 – 49	168	59	227 (18.1)	52.4	18.7	35.7
50 – 59	170	59	229 (18.2)	67.7	23.7	45.8
60 – 69	150	50	200 (15.9)	124.5	38.8	80.2
70 – 79	104	47	151 (12.0)	171.6	62.8	111.6
80 +	81	36	117 (9.3)	393.2	100.3	207.4
Total	851	405	1,256 (100.0)	47.9	22.4	35.1

* Rates are based on 2007 mid-year population.
 (Source: Singapore Department of Statistics)

Ethnic distribution

In 2007, the Malays had the highest incidence of TB (46.7 per 100,000 population) followed by the Chinese (33.7

per 100,000). The Indians had the lowest incidence of TB (25.8 per 100,000) (Table 6.12).

Table 6.12
Ethnic-gender distribution and ethnic-specific incidence rates of reported tuberculosis among Singapore residents, 2007

Ethnic group	Male	Female	Total (%)	Incidence rate per 100,000 population*
Chinese	638	268	906 (72.1)	33.7
Malay	143	86	229 (18.2)	46.7
Indian	52	29	81 (6.4)	25.8
Others	18	22	40 (3.2)	43.4
Total	851	405	1,256 (100.0)	35.1

* Rates are based on 2007 mid-year population.
 (Source: Singapore Department of Statistics)

Clinical presentation and bacteriological status

In 2007, among the 1,074 newly notified Singapore residents with pulmonary TB, 1,036 (96.5%) had bacteriological tests done. The proportion found to

have demonstrable bacillary disease was 81.5% (Table 6.13).

Table 6.13
Distribution of bacillary cases in Singapore residents with pulmonary tuberculosis
(new cases), 1987 – 2007

Year	No. tested for bacillary disease	% of notified pulmonary cases tested	No. of pulmonary cases with bacillary disease	% of pulmonary cases tested positive	Incidence rate per 100,000 population
1987	1,299	96.5	665	51.2	26.0
1988	1,341	97.6	710	52.9	27.3
1989	1,307	96.8	764	58.5	28.9
1990	1,183	95.2	741	62.6	27.1
1991	1,362	96.6	870	63.9	31.1
1992	1,330	96.4	843	63.4	29.6
1993	1,394	94.8	887	63.6	30.5
1994	1,255	94.9	861	68.6	29.1
1995	1,361	94.0	919	67.5	30.5
1996	1,550	97.4	1,034	66.7	33.7
1997	1,534	97.3	1,001	65.3	32.0
1998	1,617	97.7	1,114	68.9	35.0
1999	1,382	98.4	994	71.9	30.8
2000	1,326	97.6	888	67.0	27.1
2001*	1,218	95.3	878	72.0	26.4
2002	1,250	98.4	903	72.2	26.7
2003	1,204	97.9	911	75.7	27.1
2004	1,107	94.1	892	80.6	26.1
2005	1,092	95.6	933	85.4	26.9
2006	1,034	96.5	885	85.6	25.1
2007	1,036	96.5	844	81.5	23.6

* Starting with 2001, the table includes only bacteriological investigations (smear and/or cultures) done from three months before to two weeks after the date of notification or date of starting treatment, whichever earlier.

Culture and drug sensitivity examination of TB *bacilli* in sputum showed an increase in the incidence of single and multiple primary drug resistance among new TB cases in Singapore residents. In 2007, the overall drug resistance was 6.3%, with 4.0% (33 cases) being resistant to one drug and 2.3% (19 cases) being resistant

to two or more drugs (Table 6.14). Of the cases resistant to more than one drug, three (0.4% of total examined) were multi-drug-resistant TB (MDRTB), i.e. resistant to Rifampicin and Isoniazid. There were no cases of extensively-drug-resistant TB (XDRTB).

Table 6.14
Mycobacterium bacterial drug sensitivity in Singapore residents with pulmonary tuberculosis, 2004 – 2007

Sensitivity result of sputum examination *	2004		2005		2006		2007	
	No.	%	No.	%	No.	%	No.	%
Sensitive to:								
Streptomycin, Isoniazid & Rifampicin	805	96.1	837	93.5	793	92.1	775	93.7
Resistant to:								
Single drug	22	2.6	38	4.3	47	5.4	33	4.0
More than 1 drug	11	1.3	20	2.2	21	2.4	19	2.3
Total examined	838	100.0	895	100.0	861	100.0	827	100.0
Resistant to Rifampicin & Isoniazid	2		2		3		3	

* In the case of dual lesions, the sensitivity result recorded is that of organisms cultured from sputum.

Relapsed TB cases

The number of relapsed TB cases notified among Singapore residents was 138 in 2007. Most of these

cases were seen in older age groups and in the male population (Table 6.15).

Table 6.15
Singapore residents with relapsed tuberculosis by gender, 2003 – 2007

Age (Yrs)	No. of relapses										
	2003		2004		2005		2006		2007		
	Male	Female	Male	Female	Male	Female	Male	Female	Male	Female	
0 – 9	0	0	0	0	0	0	0	0	0	0	0
10 – 19	1	0	0	0	1	1	0	1	3	0	0
20 – 29	2	4	2	2	4	1	2	0	2	5	5
30 – 39	9	5	4	0	6	5	2	5	9	1	1
40 – 49	12	6	15	3	12	4	16	6	13	3	3
50 – 59	28	10	26	6	19	4	17	1	19	2	2
60 – 69	37	3	39	4	24	6	33	4	27	6	6
70 +	62	6	55	12	42	10	44	6	44	4	4
Total	151	34	141	27	108	31	114	23	117	21	21
Male & Female	185		168		139		137		138		

In 2007, of the 105 relapsed cases with pulmonary disease that had bacterial sensitivity tests, 5 cases (4.8%) were resistant to one drug and 2 cases (1.9%) were resistant to two or more drugs (Table 6.16),

compared to 4.0% and 2.3% respectively among the new cases (Table 6.14). There was one case of MDRTB, i.e. resistant to Rifampicin and Isoniazid.

Table 6.16
Mycobacterium bacterial drug sensitivity in Singapore residents with relapsed pulmonary tuberculosis, 2004 – 2007

Sensitivity result of sputum examination *	2004		2005		2006		2007	
	No.	%	No.	%	No.	%	No.	%
Sensitive to:								
Streptomycin, Isoniazid & Rifampicin	100	85.5	94	89.5	91	90.1	98	93.3
Resistant to:								
Single drug	16	13.7	9	8.6	5	4.9	5	4.8
More than 1 drug	1	0.8	2	1.9	5	4.9	2	1.9
Total examined	117	100.0	105	100.0	101	100.0	105	100.0
Resistant to Rifampicin and Isoniazid	0		1		3		1	

* In the case of dual lesions, the sensitivity result recorded is that of organisms cultured from sputum.

Tuberculosis – HIV infection in residents

Persons diagnosed with HIV are known to be particularly susceptible to TB, both from the reactivation of latent infection and from new infection with rapid progression to active disease.

In 2007, 4.7% of the 1,256 new cases notified among Singapore residents had prior diagnosis of HIV, an

increase from 4.0% in 2006. Of the 138 relapsed TB cases notified among Singapore residents in 2007, 3.6% had been previously diagnosed with HIV, which was an increase from 2.2% in 2006. Most of these TB-HIV infections were seen in older age groups and in the male population (Table 6.17). The majority of the TB-HIV infections occurred in the Chinese (Table 6.18).

Table 6.17
Age-gender distribution of reported tuberculosis-HIV infection among Singapore residents, 2006 – 2007

Age (Years)	New cases				Relapsed cases			
	2006		2007		2006		2007	
	Male	Female	Male	Female	Male	Female	Male	Female
0 – 9	0	0	0	0	0	0	0	0
10 – 19	0	0	0	0	0	0	0	0
20 – 29	1	1	1	0	0	0	0	0
30 – 39	6	2	9	0	0	0	1	0
40 – 49	14	0	20	2	1	0	2	0
50 – 59	11	1	12	0	0	0	0	0
60 – 69	5	0	3	0	1	0	2	0
70 +	1	0	0	0	0	0	0	0
Total	38	4	45	2	2	0	5	0
Male & Female	42		47		2		5	

Table 6.18
Ethnic-gender distribution of reported tuberculosis-HIV infection among Singapore residents, 2006 – 2007

Ethnic group	New cases				Relapsed cases			
	2006		2007		2006		2007	
	Male	Female	Male	Female	Male	Female	Male	Female
Chinese	32	3	39	0	2	0	4	0
Malay	4	1	6	1	0	0	1	0
Indian	1	0	0	0	0	0	0	0
Others	1	0	0	1	0	0	0	0
Total	38	4	45	2	2	0	5	0

Tuberculosis in non-residents

In 2007, the number of new TB cases among non-residents with long-term immigration passes residing in Singapore increased by 27 cases as compared

with 2006, with a total of 352 new cases notified. This constituted 17.5% of all new cases notified in 2007 (Table 6.19).

Table 6.19
Distribution of non-residents (with long-term immigration passes residing in Singapore) with tuberculosis by year and site of disease, 2001 – 2007

Year	No. of new TB cases notified					
	Pulmonary		Extrapulmonary		Total	
	No.	% of total new cases notified	No.	% of total new cases notified	No.	% of total new cases notified
2001	247	11.7	64	3.0	311	14.7
2002	223	11.2	54	2.7	277	13.9
2003	231	11.6	50	2.5	281	14.1
2004	170	8.9	48	2.5	218	11.4
2005	210	10.8	60	3.1	270	13.9
2006	249	12.6	76	3.9	325	16.5
2007	275	13.6	77	3.8	352	17.5

In 2007, the number of new TB cases among short stay non-residents increased by 15 cases as compared with 2006, with a total of 406 new cases notified. This

constituted 20.2% of all new cases notified in 2007 (Table 6.20).

Table 6.20
Distribution of non-residents (short stay in Singapore) with tuberculosis by year and site of disease, 2001 – 2007

Year	No. of new TB cases notified					
	Pulmonary		Extrapulmonary		Total	
	No.	% of total new new cases notified	No.	% of total new cases notified	No.	% of total new cases notified
2001	283	13.4	45	2.1	328	15.5
2002	244	12.3	41	2.1	285	14.3
2003	283	14.2	29	1.5	312	15.6
2004	279	14.6	59	3.1	338	17.6
2005	295	15.2	55	2.8	350	18.1
2006	316	16.0	75	3.8	391	19.8
2007	340	16.9	66	3.3	406	20.2

The largest group of non-residents reported to have TB was work permit holders (284 cases), followed by foreign

visitors (225 cases) (Table 6.21).

Table 6.21
Distribution of non-residents with tuberculosis by pass category/status, 2003 – 2007

Pass category / status	No. of new TB cases notified				
	2003	2004	2005	2006	2007
Long-Term Immigration Pass Holders Residing in Singapore					
Work Permit Holders	212	174	198	251	284
Employment Pass Holder	30	10	29	21	26
Other Pass Holders *	39	34	43	53	42
Short Stay Foreigners					
Work Permit Applicants	102	72	70	89	80
Visitors **	132	189	188	216	225
Others ***	78	77	92	86	101
Total	593	556	620	716	758

* Professional pass holder, dependent pass holder, long-term social visit pass holder and student pass holder and S pass holder

** Short term social visitor

*** Professional visit pass, dependent pass applicant, long-term social visit pass applicant, student pass applicant, employment pass applicant, S pass applicant and illegal immigrant

Tuberculosis mortality

In 2007, there were 80 deaths from tuberculosis among Singapore residents giving a mortality rate of 2.2 cases per 100,000 population (Table 6.22). The majority were

males (81.3%) and most of them (72.5%) were aged 60 years and above. In 2007, tuberculosis accounted for 0.5% of all deaths in Singapore.

Table 6.22
Age-gender distribution and age-specific mortality rates of tuberculosis, 2007

Age (Yrs)	Male	Female	Total (%)	Mortality rate per 100,000 population*
20 – 29	0	1	1 (1.3)	0.2
30 – 39	0	1	1 (1.3)	0.2
40 – 49	6	1	7 (8.7)	1.1
50 – 59	13	0	13 (16.2)	2.6
60 – 69	15	3	18 (22.5)	7.2
70 +	31	9	40 (50.0)	20.9
Total	65	15	80 (100.0)	2.2

* Rates are based on 2007 estimated mid-year population.
 (Source: Singapore Department of Statistics, Registry of Births & Deaths)

LEPROSY

Leprosy is a chronic bacterial disease of the skin, peripheral nerves and (in lepromatous patients) the upper airway by *Mycobacterium leprae*. The manifestations of the disease vary in a continuous spectrum between the two polar forms, lepromatous and tuberculoid leprosy.

The incidence rate of leprosy among Singapore residents has declined over the past three decades, from 21.3 per 100,000 population in 1960 to 0.1 per 100,000 population in 2007 (Figure 6.5). In 2007, a total of four Singapore residents with leprosy were notified (Table 6.23).

Figure 6.5
Incidence rate of leprosy among Singapore residents, 1960 – 2007

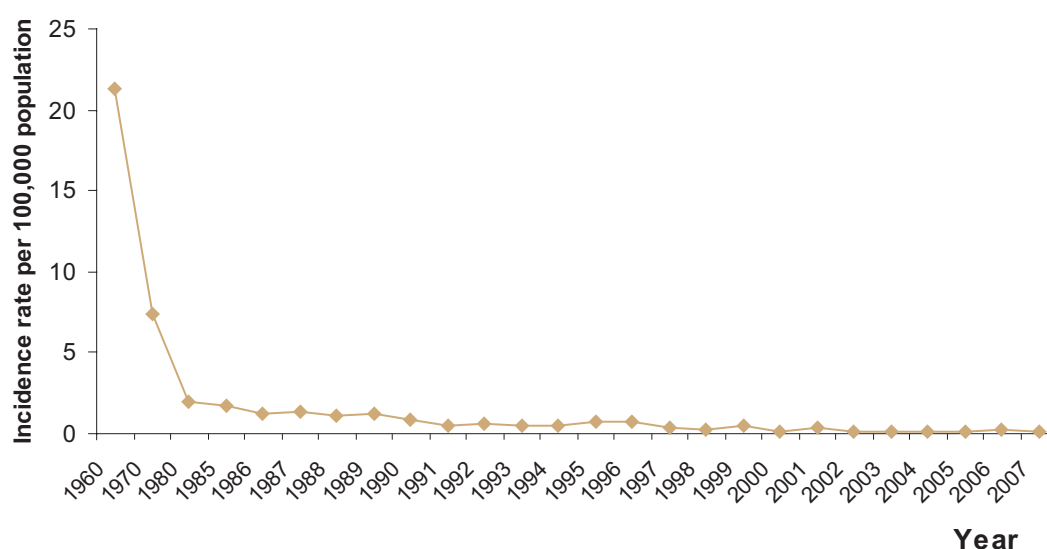


Table 6.23
Age-gender distribution and age-specific incidence rates of reported leprosy among Singapore residents, 2007

Age (Yrs)	Male	Female	Total (%)	Incidence rate per 100,000 population*
0 – 9	0	0	0 (0.0)	-
10 – 19	0	0	0 (0.0)	-
20 – 29	1	0	1 (25.0)	0.2
30 – 39	0	0	0 (0.0)	-
40 – 49	0	0	0 (0.0)	-
50 – 59	0	0	0 (0.0)	-
60 – 69	2	0	2 (50.0)	0.8
70 +	1	0	1 (25.0)	0.5
Total	4	0	4 (100.0)	0.1

* Rates are based on 2007 estimated mid-year population.
(Source: Singapore Department of Statistics)

Clinical presentation

Leprosy patients were classified into lepromatous, borderline lepromatous, borderline tuberculoid, tuberculoid and neuroleprosy types. Among the four

residents, two had borderline lepromatous leprosy, and two had tuberculoid leprosy (Table 6.24).

Table 6.24
Clinical presentation in Singapore residents with leprosy, 2007

Type of leprosy	No. of cases (%)
Lepromatous	0 (0.0)
Borderline Lepromatous	2 (50.0)
Borderline Tuberculoid	0 (0.0)
Tuberculoid	2 (50.0)
Neuroleprosy	0 (0.0)
Unknown / Others	0 (0.0)
All types	4 (100.0)

Leprosy in non-residents

In 2007, eight non-residents with leprosy were detected. The contribution of non-residents to the total number of cases has fluctuated over the years. It decreased from

69% in 2005 to 42% in 2006 and subsequently increased to 67% in 2007 (Table 6.25).

Table 6.25
Distribution of non-residents with leprosy by gender, 1980 – 2007

Year	No. of cases			% of total cases notified
	Male	Female	Total	
1980	14	7	21	32
1985	10	6	16	28
1986	7	2	9	23
1987	5	6	11	25
1988	4	6	10	26
1989	8	10	18	37
1990	7	5	12	33
1991	6	3	9	41
1992	15	9	24	59
1993	5	4	9	38
1994	8	5	13	48
1995	7	4	11	33
1996	8	2	10	43
1997	9	4	13	57
1998	10	2	12	63
1999	5	3	8	36
2000	9	4	13	72
2001	1	2	3	21
2002	7	1	8	73
2003	5	1	6	54
2004	4	4	8	57
2005	6	3	9	69
2006	3	2	5	42
2007	6	2	8	67