

The changing face of the HIV epidemic in western Europe: what are the implications for public health policies?

Françoise F Hamers, Angela M Downs

Lancet 2004; 364: 83–94

See Editorial page 1

EuroHIV, Department of Infectious Diseases, Institut de Veille Sanitaire, 12 rue du Val d'Osne, 94415 Saint-Maurice, France (F F Hamers MD, A M Downs PhD)

Correspondence to: Françoise Hamers
f.hamers@invs.sante.fr

In this review, we describe changes in dynamics of HIV transmission and shifts in affected populations in western Europe using HIV/AIDS surveillance data and published and unpublished reports. Despite substantial reductions in HIV-related morbidity and mortality since the introduction of highly active antiretroviral treatment, HIV continues to pose a major public health problem in western Europe. More than half a million people are living with an infection that remains incurable and requires costly lifelong treatment; many people remain unaware of their infection, and thousands of new infections continue to occur every year. Migrants from countries with a high prevalence of HIV/AIDS, notably sub-Saharan Africa, bear a disproportionate and increasing share of HIV throughout western Europe and, in most countries, account for the majority of heterosexually acquired HIV infections diagnosed in recent years. Prevention, treatment, and care must be adapted to reach migrant populations. Following a resurgence of risky sexual behaviour, HIV transmission may now be increasing among homosexual and bisexual men, and renewed safer sex campaigns are urgently needed.

Introduction

Over the past two decades, the HIV/AIDS epidemic has had profound and lasting effects on societies in western Europe, severely affecting some communities and resulting in major changes in sexual and drug-use behaviours. By the time the first AIDS cases were reported in the early 1980s,^{1–4} HIV had already spread widely among homosexual and drug-user communities throughout western Europe. It has been estimated that HIV incidence peaked around 1983 among homosexual men and in 1987–88 among injecting drug users, with 120 000 homosexual and bisexual men infected by 1985, and 144 000 injecting drug users infected by 1989.⁵ Heterosexually acquired infections increased slowly during the late 1980s and early 1990s.

Extensive prevention programmes set up in the 1980s had a strong impact in altering behaviours that put people at risk for HIV infection, particularly among high-risk communities.^{6–8} Systematic screening of blood donations since 1985 virtually eliminated the risk of HIV transmission through blood transfusion.^{9–14} In the 1990s, large-scale voluntary HIV testing of pregnant women followed by antiretroviral treatment of those found to be seropositive, and other interventions to reduce the risk of vertical transmission, were implemented.^{15–19} The rate of vertical transmission in Europe fell from 15.5% by 1994 to 2.6% after 1998.²⁰ Although the modality of pregnancy-related HIV testing can differ from country to country,^{15–19} the net result has been a substantial drop in the number of HIV-infected newborn babies and a continuing decline in the incidence of vertically acquired AIDS in infants younger than 1 year, from a peak of 127 cases in 1993 to 15 cases in 2002 (EuroHIV, unpublished data).

Highly active antiretroviral treatment, widely used in western Europe since 1996–97, has greatly reduced HIV-related morbidity and mortality,²¹ and resulted in substantial declines in AIDS incidence and deaths that

cannot be fully explained by earlier decreases in HIV transmission.^{22–25} Similar declines occurred in all countries except Portugal, a country with a much later epidemic primarily associated with drug use, but where a clear break in the epidemic curve suggests that the impact of treatment was also strong (figure 1).

At the start of the 21st century, HIV/AIDS nevertheless remains a communicable disease of major public health importance in western Europe. An estimated 520 000–610 000 people have an infection that remains incurable and needs extensive and costly treatment.^{26–28} The potential to infect others is lifelong, and the stigma of the infection is enduring. Moreover, large numbers of people remain unaware of their infection, and can therefore neither benefit from treatment nor take steps to reduce the risk of passing

Search strategy and selection criteria

We defined western Europe as the 15 countries of the European Union (EU) in 2003 (Austria, Belgium, Denmark, Finland, France, Germany, Greece, Ireland, Italy, Luxembourg, Netherlands, Portugal, Spain, Sweden, UK) together with Iceland, Norway, and Switzerland. We used surveillance databases on HIV/AIDS case reporting and HIV prevalence maintained by the EU-funded EuroHIV surveillance network (formerly European Centre for the Epidemiological Monitoring of AIDS, <http://www.eurohiv.org>).³⁰ Data on HIV prevalence among injecting drug users were largely obtained from the European Centre for Monitoring for Drugs and Drug Addiction.³¹ We searched published work through PubMed with appropriate MeSH terms and the “explode” function. Searches were not restricted by language. We consulted the internet websites of the national surveillance centres of all 18 countries. We identified grey literature (government and other institution reports) and unpublished data through the EuroHIV network of national HIV/AIDS surveillance co-ordinators.

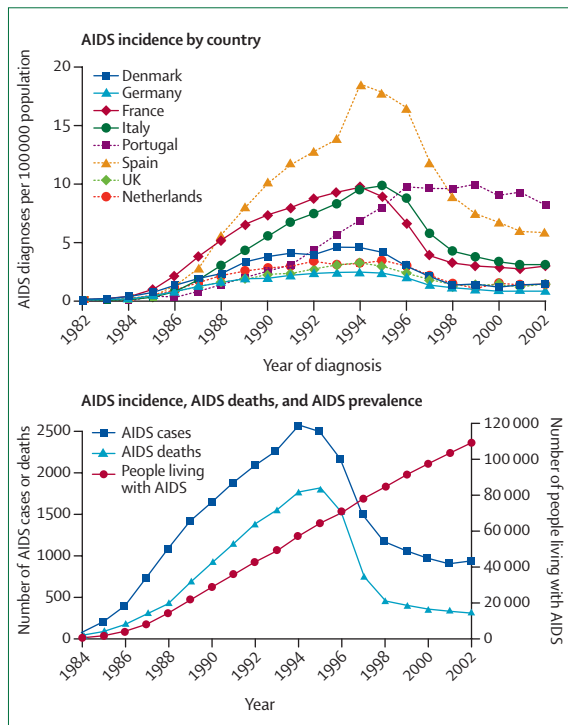


Figure 1: Trends in AIDS incidence, AIDS deaths, and AIDS prevalence in western Europe

Upper graph: AIDS incidence in selected countries. Data reported at June 30, 2003, adjusted for reporting delays. Lower graph: AIDS diagnoses, deaths among patients with AIDS, and AIDS prevalence, western Europe (18 countries). Data reported at June 30, 2003, adjusted for reporting delays. AIDS prevalence estimated by subtracting the cumulative number of deaths among patients with AIDS from the cumulative number of AIDS cases.

their infection to others.²⁹ An estimated 30 000–40 000 infections continue to occur every year.²⁶ We review the recent epidemiology of HIV in western Europe, highlighting changes in transmission dynamics and vulnerable populations, and discuss potential reasons for the emerging trends and their implications for prevention and control.

Data sources

Our search strategy and selection criteria are shown in the panel. In western Europe, as in other industrialised countries, the reporting of AIDS cases was the main instrument for monitoring the HIV epidemic until the mid 1990s. However, since the widespread use of effective antiretroviral treatment, the incidence of AIDS has become less representative of the underlying trends in HIV transmission. To better monitor these trends, the reporting of HIV diagnoses, already implemented in some countries, was instituted at European level in 1999.³⁰ Individual, anonymous data about cases of AIDS and new HIV diagnoses are reported every 6 months to EuroHIV in a standardised format.³⁰ Although HIV reporting is now widely implemented in the region, coverage

remains incomplete, especially in the most affected countries (table 1). HIV reporting has started only recently in Portugal (2000), the Netherlands (2002), and France (2003), does not exist in all regions in Italy and Spain, and has not been implemented in Austria.^{35–38}

Aggregate data about HIV prevalence in specific population groups are compiled in the European HIV Prevalence Database.^{14,30} Various systems have been set up to monitor HIV prevalence among specific sub-populations in different countries. Important differences in methods and settings must be taken into account in interpretation of the data. The most reliable data come from carefully designed seroprevalence studies, some of which are based on unlinked anonymous testing that reduces participation biases. Self-reported HIV serostatus can provide a useful indicator of prevalence levels and trends, although not a measure of true prevalence, since people who are never tested are excluded, and others may have seroconverted since their last test. Results from diagnostic testing are especially difficult to interpret, since they are likely to be subject to strong participation biases.

Recent epidemic trends

Newly diagnosed HIV infections

Data for all newly diagnosed HIV infections since 1995 are available for 12 of the 18 countries, which account for 51% (198 million) of the total population (table 1). In these 12 countries, the number of new diagnoses reported each year increased by 46% between 1997 (7770 cases) and 2002 (11 337), with a substantial rise in 2002 (28%) compared with 2001 (8871 cases; figure 2). Between 1997 and 2002, HIV diagnoses decreased gradually among injecting drug users (16%, from 623 to 522), but increased greatly in people infected through heterosexual contact (122%, from 2490 to 5526), largely because of an increase in the number of cases diagnosed in people originating from countries with generalised HIV epidemics (179%, from 1382 to 3861), primarily sub-Saharan Africa (more than 90% of these people). Among homosexual and bisexual men, HIV diagnoses increased in 2002 (22%, from 2757 in 2001 to 3371 in 2002) after a slow decline in the previous years. Along with these changes in transmission patterns, the proportion of women among people newly diagnosed with HIV infection increased from 25% (1955 of 7770) in 1997 to 38% (4269 of 11 337) in 2002.

These trends were largely driven by the UK, which accounted for 30% of the population and about 40% of HIV diagnoses reported in the 12 countries during 1997–2002 and where the increase has been especially pronounced.^{14,29} However, increasing trends were also noted recently in most other countries, including Belgium, Denmark, Germany, Sweden, Switzerland,

and especially Ireland where the rise has been even more striking than in the UK.^{14, 39-43}

Limited data for countries that have been most severely affected and where injecting drug users have played a major part in the spread of HIV suggest similar shifts in affected populations. In Portugal, where yearly numbers of new HIV diagnoses have been available since 2000, rates of new HIV diagnoses (25.5 per 100 000 population in 2002) are much higher than elsewhere, and although injecting drug use remains the largest mode of transmission (46%), it is now closely followed by heterosexual contact (43%; table 1, figure 3). In Italy, heterosexual transmission accounted for most HIV infections diagnosed in 2000 in the five regions or provinces with available data (home to 21% of the Italian population).³⁸ Similarly, in Spain, heterosexual transmission was the predominant transmission group (45%) for the 356 HIV infections diagnosed in 2000-01 in the three regions with available data (2.5 million population), whereas homosexual contact and injecting drug use each accounted for 26% of the cases.⁴⁴ In one of these regions, Navarra, the number of new HIV diagnoses fell steadily between 1991 (134 cases, 25.3 per 100 000) and 2002 (30 cases, 5.7 per 100 000).⁴⁵ The decrease has been substantial among injecting drug users, whereas numbers of cases in homosexuals and heterosexuals have remained fairly stable. In France,

preliminary data for 2003 indicate that two-thirds of new HIV diagnoses were in people infected by heterosexual contact (Institut de Veille Sanitaire, unpublished data).

Data for reported HIV diagnoses should be interpreted with caution because they do not represent HIV incidence. These data include many individuals infected in previous years and depend on uptake of HIV testing and patterns of reporting, both of which may vary between countries and over time.⁴⁶ Recent upward trends in HIV diagnoses could therefore be due, at least partly, to increases in HIV testing or to better reporting. In the UK, uptake of voluntary counselling and testing among people attending sexual health clinics increased between 1997 and 2002 in homosexual and bisexual men (from 45% to 62%) and in heterosexuals (from 25% to 54%),²⁹ and in Denmark the total number of HIV tests done each year has been increasing since 1998.⁴⁷ However, in Belgium, numbers have decreased, and in the few other countries where such data are available (Austria, Finland, Luxembourg, and Norway), no recent changes have been detected.^{39,46}

New cases of AIDS

The fall in cases of AIDS noted since 1995 slowed noticeably after 1998 and has now levelled off in most countries (figure 1). The majority of people developing

Country	Total country population in 2003 (million)	Year HIV reporting started	HIV diagnoses in 2002			AIDS diagnoses in 2002			Most recent estimates of people living with HIV/AIDS			
			Number	Rate	Predominant transmission group (%) [*]	Number	Rate	Predominant transmission group (%) [*]	Number	Rate	Year	Source
Austria	8.1	...	...	...	...	70	0.9	HC (57%)	9900	122.8	2001	UNAIDS ³²
Belgium†	10.3	1986	973	9.5	HC (66%)	187	1.8	HC (81%)	8500	82.6	2001	UNAIDS ³²
Denmark†	5.4	1990	286	5.4	HC (53%)	41	0.8	HC (53%)	3800	71.0	2001	UNAIDS ³²
Finland†	5.2	1986	130	2.5	HC (37%)	21	0.4	HC (52%)	1200	23.1	2001	UNAIDS ³²
France	61.6	2003‡	...	...	...	2004	3.3	HC (55%)	96 600	156.7	2003	InVS
Germany†	82.0	1993	1866	2.3	HBM (49%)	715	0.9	HBM (63%)	43 000	52.5	2003	RKI ³³
Greece†	10.6	1999§	403	3.8	HBM (58%)	91	0.8	HBM (59%)	8800	82.8	2001	UNAIDS ³²
Iceland†	0.3	1985	7	2.5	HBM (50%)	0	0.0	...	220	77.1	2001	UNAIDS ³²
Ireland†	3.9	1985	364	9.4	HC (69%)	13	0.3	HC (50%)	2400	61.3	2001	UNAIDS ³²
Italy	57.4	¶	...	...	...	1753	3.1	HC (42%)	120 000	209.2	2001	ISS
Luxembourg†	0.5	1999§	33	7.4	HBM/HC (42%)	1	0.2	...	360	79.5	2001	UNAIDS ³²
Netherlands	16.0	2002||	735	4.6	HBM (53%)	234	1.5	HBM (51%)	17 000	106.3	2001	UNAIDS ³²
Norway†	4.5	1986	203	4.5	HC (76%)	33	0.7	HC (76%)	1800	39.8	2001	UNAIDS ³²
Portugal	10.1	2000**	2562	25.5	IDU (46%)	822	8.2	IDU (46%)	27 000	268.3	2001	UNAIDS ³²
Spain	39.9	¶	...	...	...	2356	5.9	IDU (55%)	130 000	325.7	2003	MSC
Sweden†	8.8	1985	286	3.2	HC (59%)	59	0.7	HC (60%)	3300	37.4	2001	UNAIDS ³²
Switzerland†	7.2	1985	754	10.5	HC (58%)	194	2.7	HC (48%)	19 000	265.2	2001	UNAIDS ³²
UK†	59.8	1984	6032	10.1	HC (61%)	878	1.5	HC (67%)	49 500	82.8	2002	HPA ²⁹
Total††	391.4		14 634	6.5	HC (52%)	9472	2.4	HC (44%)	542 380	138.6	..	

New HIV diagnoses by year of report; AIDS cases by year of diagnosis adjusted for reporting delays. Source of population data: United Nations Population Division.³⁴ Rates are per 100 000 total population; total rates are calculated using as denominators countries with available data. HBM=Homosexual and bisexual men; IDU=Injecting drug users; HC=People infected through heterosexual contact. HPA=Health Protection Agency. InVS=Institut de Veille Sanitaire. ISS=Istituto Superiore di Sanita. MSC=Ministerio de Sanidad y Consumo. RKI=Robert Koch Institute. *Percentage in predominant transmission group calculated after exclusion of cases reported without transmission group. †Countries for which HIV reporting data are available since 1995 or before and which are included in figure 2. ‡HIV reporting system implemented in 2003, no retrospective reporting of prevalent diagnoses. §HIV reporting started in 1999 but includes retrospective reporting of cases diagnosed in previous years that have been redistributed to years of diagnosis. ¶No national HIV reporting system but regional systems which started at different times in some regions. ||HIV reporting system implemented in 2002; HIV data for 2002 presented in this table exclude cases diagnosed in previous years. **Previously existing HIV reporting system completely redesigned in 2000. ††Totals for HIV diagnoses are not representative of western Europe because data exclude the most affected countries; they cannot be compared with AIDS totals.

Table 1: Cases of HIV infection and AIDS diagnosed in 2002, and most recent estimates of people living with HIV/AIDS in western Europe

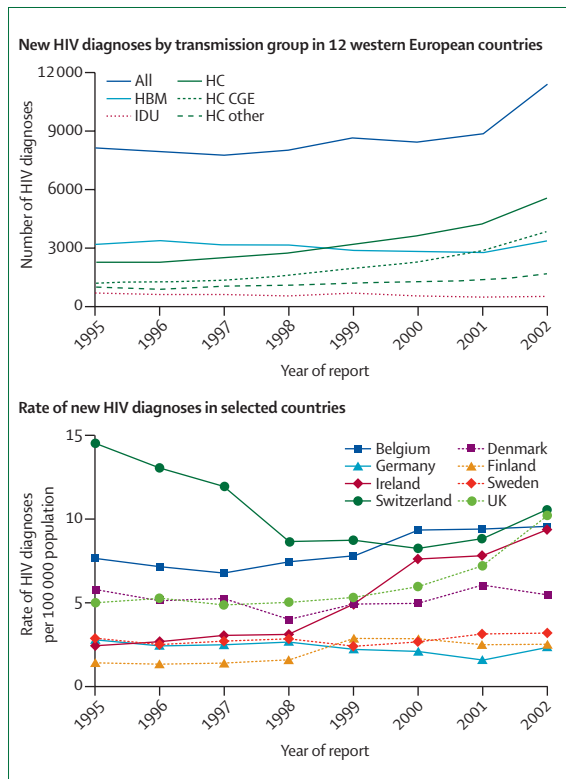


Figure 2: Trends in new HIV diagnoses in 12 countries of western Europe
Upper graph: New HIV diagnoses in the main transmission groups by year of report in the 12 countries of western Europe where data are available for the entire period 1995–2002: Belgium, Denmark, Finland, Germany, Greece, Iceland, Ireland, Luxembourg, Norway, Sweden, Switzerland, UK. HBM=Homosexual and bisexual men. IDU=Injecting drug users; HC=People infected through heterosexual contact. HC CGE=HC originating from countries with generalised HIV epidemics. HC other=HC not reported to originate from countries with generalised epidemics (HC CGE and HC other are sub sets of HC). Lower graph: new HIV diagnoses in selected countries.

AIDS today are unaware that they are HIV-infected, and hence have had no opportunity to benefit from antiretroviral treatment. AIDS surveillance has thus become essentially a measure of diagnostic or treatment failure.⁴⁸ Furthermore, reporting of AIDS may have become less complete, since clinicians might now attach less importance to clinical AIDS than to laboratory markers. Among 8916 individuals who had a known date of first HIV-positive test and who were diagnosed with AIDS in western Europe in 2002, 55% (4872) discovered their seropositivity only 6 months or less before developing AIDS (EuroHIV, unpublished data). This proportion varied from 22% (545 of 2487) among injecting drug users to 58% (1065 of 1825) among homosexual and bisexual men and 72% (2621 of 3665) among heterosexually infected people. Among 9238 people diagnosed with AIDS in western Europe in 2002 (excluding the Netherlands, where data on AIDS indicative disease were not available for 2002), 2260 (25%) had *Pneumocystis carinii* pneumonia and 2085 (23%) had tuberculosis as initial AIDS indicative

disease, both of which can be prevented by antiretroviral therapy.

Since access to health care is almost universal in western Europe, most HIV-infected people who are aware of their serostatus are eligible for free treatment.⁴⁹ In the UK and in Spain more than three-quarters of the patients seen for care in 2002 and eligible for antiretroviral therapy were receiving treatment.^{29,50} Some findings suggest, however, that access to treatment differs according to sociodemographic characteristics, and that injecting drug users are less likely than others to receive and benefit from antiretroviral treatment.^{51–53} Similar concerns can be raised for illegal immigrants, although data in this group are very scarce.⁵⁴

People living with HIV/AIDS

Recent nationally-produced estimates of total HIV prevalence are available in France, Germany, Italy, Spain, and the UK (table 1). In Germany, among the 43 000 individuals estimated to be living with HIV at the end of 2003, 50% were infected through homosexual contact, 41% through heterosexual contact (of whom 60% are from countries with generalised HIV epidemics), and 9% by injecting drug use.³³ In the UK, an estimated 49 500 people were living with HIV at the end of 2002, a 20% increase over the previous year.²⁹ Among infected people, 49% are heterosexual men and women (of whom 63% are African), 46% homosexual or bisexual men, and 3% injecting drug users. UNAIDS and WHO have published country-specific estimates for 2001, and estimated that 520 000–680 000 people were living with HIV in western Europe by the end of 2003.^{26,32} Many of those were infected many years ago, and about a fifth have reached the stage of AIDS (see below). Reduced HIV-related mortality together with possibly rising rates of sexual transmission of HIV has certainly resulted in increased prevalence in recent years.

By the end of June, 2003, a cumulative total of 259 000 people with AIDS had been diagnosed, of whom 152 000 were known to have died, leaving an estimated 107 000 people alive who had experienced an AIDS-defining illness (figure 1). Their characteristics are largely similar to those noted in past epidemics. Half were diagnosed with AIDS in or before 1996 (EuroHIV, unpublished data). Their median age (by mid 2003) was 41 years and 22% were female. Overall, 40% were infected through sharing drug injecting equipment, 28% through homosexual contact, and 27% through heterosexual contact.

Vulnerable populations and areas for concern

Homosexual and bisexual men

Currently, the prevalence of HIV among homosexual and bisexual men is 10–20% in most western European countries; prevalence is usually higher in large cities

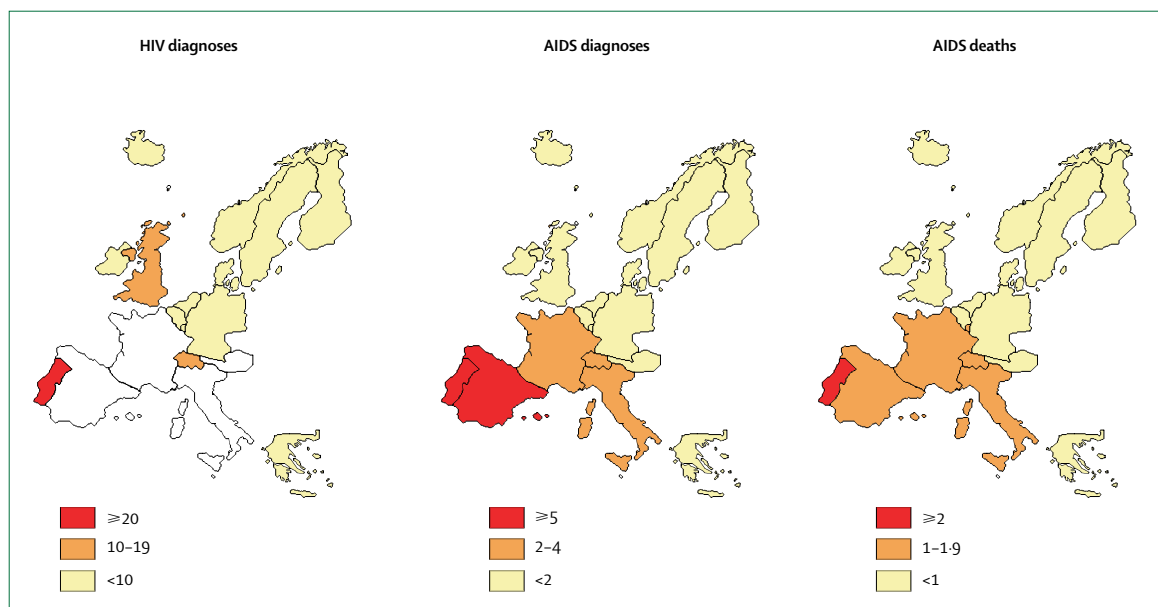


Figure 3: Rates of new HIV diagnoses, AIDS diagnoses, and AIDS deaths per 100 000 population, 2002
No national data available for countries in white.

than elsewhere (table 2).⁵⁵ Since the late 1990s, striking increases in rates of syphilis and gonorrhoea and rises in HIV-related risk behaviours have occurred among homosexual and bisexual men in western Europe as well as in other parts of the industrialised world.^{29,56,63–76} Increases in risky sexual behaviour in a population in which HIV is already highly prevalent, coupled with increases in sexually transmitted infections that enhance the risk of HIV transmission, have the potential to lead to an expansion of HIV transmission among homosexual and bisexual men.^{76–79} On the other hand, antiretroviral treatment, which lowers the viral load, may reduce the likelihood that an HIV infected person infect a partner during unprotected sexual intercourse.^{80–82} Mathematical modelling suggests that the effect of antiretroviral treatment on lowering transmission at the population level could be offset by an increase, even modest, in risk behaviour, and the net effect of these opposing forces on HIV incidence has been much debated.^{76,78,79,83}

The chief difficulty is to measure HIV incidence. The recent increases in numbers of new HIV diagnoses in homosexual and bisexual men in several countries, although relatively small, suggest possible recent increases in HIV incidence. In Germany, although earlier (1996–98) rises in newly diagnosed HIV infections were probably due to increased willingness to seek testing following improvements in treatment, a more recent increase (from 642 HIV diagnoses in 2000 to 742 in 2002) might indicate a true rise in numbers of new infections.^{41,84} In the UK, however, a rising trend in the median CD4 lymphocyte count at diagnosis in recent years suggests that homosexual and bisexual men

infected with HIV are now being detected earlier in the course of infection,²⁹ and hence that the recent rise in new HIV diagnoses results, at least partly, from increases in HIV testing.

Few incidence data are available. In Madrid, in a study among homosexual and bisexual men who repeatedly attended voluntary HIV testing centres, HIV incidence decreased from 4.7 per 100 person-years in 1988 to 1.1 in 1995, but then increased to 2.2 in 2000.⁸⁵ More recently, incidence studies based on the serological testing algorithm for recent HIV seroconversion (STARHS) have been done among homosexual and bisexual men attending sexually transmitted infection clinics in the Netherlands and the UK.^{86–88} In Amsterdam, an overall incidence of 3.0 infections per 100 person-years during 1991–2001 was noted, with a significant increase over time.⁸⁷ The increase was evident in men older than 34 years but not in younger men. In the UK, the overall annual incidence was 2.4% (3.1% in London, 1.0% elsewhere) with no significant trends in HIV incidence during 1995–2001.⁸⁸ However, more recent data showed an increasing trend to 3.5% in 2002, although this change was not statistically significant.²⁹

Injecting drug users

In most western European countries, steady declines in unsafe injecting practices and in HIV prevalence among injecting drug users occurred throughout the 1990s, reflecting success in past prevention interventions.^{31,89–93} However, HIV prevalence among drug injectors (see table 2) varies greatly between, as well as within, countries, and in some countries and

regions has remained very high (greater than 25%) since the mid-1990s and might be increasing in some regions or cities in several countries including Italy, the Netherlands, and Spain.³¹ Prevention efforts remain important to prevent further infections among injecting drug users, including through sexual intercourse, particularly in southern European countries.

Migrants

Migrants from countries with generalised HIV epidemics, particularly sub-Saharan Africa, account for a disproportionate and increasing share of HIV infections in western Europe. In the 12 countries with

available information, two-thirds (14 077 of 21 273) of all heterosexually acquired HIV infections diagnosed during 1997–2002 were in people from countries with generalised HIV epidemics (figure 2). This information reflects the worsening of the HIV epidemic in Africa during the 1990s and changing world migration patterns. In view of the status of the global pandemic, it is not surprising that migrants from countries with generalised HIV epidemics, particularly those from sub-Saharan Africa, which accounts for 24–28 million of the 40–46 million people infected worldwide, have an increased probability of being HIV-infected.²⁶ Furthermore, migration often places these same people at heightened vulnerability to

Country	Homosexual and bisexual men					Injecting drug users					Heterosexual STI patients				
	Coverage	Year	Setting	Method	HIV prevalence	Coverage	Year	Setting	Method	HIV prevalence	Coverage	Year	Setting	Method	HIV prevalence
Austria	..	..	..	..	..	National	2001	OD	DT	6% ³¹	..	..	..	..	..
	..	..	..	..	..	Vienna	2000–01	NEP	DT	1–3% ³¹	..	..	..	..	..
Belgium	National	2000	VCT	DT	2% ⁵⁵	2 regions	2000–01	DTC	DT, SR	1–3% ³¹	..	..	..	..	..
	..	..	..	..	..	Antwerp	2001	DTC, NEP	SP	6% ³¹	..	..	..	..	..
Denmark	National	2000–01	Gay venues	SR	10–15% ⁵⁵	..	..	..	..	..	..	..	..	..	..
Finland	..	..	..	..	..	National	2000–01	Prisons	DT	1–2% ³¹	..	..	..	..	..
	..	..	..	..	..	Helsinki	2001–02	NEP	DT, SP	1–2% ³¹	..	..	..	..	..
France	National	2000	Gay press	SR	14% ⁵⁶	National	2002	NEP	SR	10% ⁵⁷	..	..	..	..	..
	..	..	..	..	..	Marseille	2002	DTC, NEP	SP	20% ⁵⁸	..	..	..	..	..
Germany	National	1999	Gay press	SR	15% ⁵⁵	National	2000–01	DTC	SR	3–4% ³¹	National	2002	STI, VCT, GP	SR	2% ¹⁴
Greece	..	..	..	..	..	National	1999	DTC	DT/SR	0–2% ³¹	..	..	..	..	..
Ireland	National	2000	Gay venues	SR	5% ⁵⁵	National	1999	Prisons	SP	6% ³¹	..	..	..	..	..
	..	..	..	..	..	Eastern region	1999	DTC	DT	9% ³¹	..	..	..	..	..
Italy	..	..	..	..	..	National	2001	DTC	DT	15% ³¹	National	2002	STI *	SP	7% ¹⁴
	..	..	..	..	..	21 regions	2001	DTC	DT	2–34% ³¹	..	..	..	..	..
Luxembourg	..	..	..	..	..	National	2001	DTC	SR	3% ³¹	..	..	..	..	..
Netherlands	Amsterdam	2002	STI	SP	20% ⁵⁹	5 regions/cities	1999–02	DTC	SP	2–22% ^{31,59}	National	2002	STI *	DT	0.5% ¹⁴
	Amsterdam	2002	STI	DT	4% ⁵⁹	..	..	..	..	..	..	..	..	..	..
Norway	..	..	..	..	..	2 regions/cities	2001	DTC	SP	3–15% ³¹	..	..	..	..	..
Portugal	..	..	..	..	..	National	2001	DTC	DT	14–18% ³¹	..	..	..	..	..
	..	..	..	..	..	Lisbon	2001	DTC	DT	20% ³¹	..	..	..	..	..
Spain	National	2002	VCT	DT	5% ⁴⁴	National	2002	VCT	DT	10% ⁴⁴	National	2002	STI *	SP	0.3% ¹⁴
	Catalonia	2002	Gay venues	SP	18% ⁴⁴	National	2001	DTC	DT	35% ³¹	..	..	..	..	..
	..	..	..	..	..	Catalonia	2001	DTC	DT	38% ^{48,60}	..	..	..	..	..
Switzerland	National	2000	Gay press	SR	11% ⁵⁵	National	2002	VCT	DT	3% ⁴³	National	2002	STI *	SP	4% ¹⁴
UK	National	2002	STI	SP	18% ⁶¹	England, Wales	2002	DTC, NEP	SP	1% ⁶²	National	2002	STI	SP	0.7% ¹⁴
	London	2002	STI	SP	26% ⁶¹	London	2002	DTC, NEP	SP	4% ⁶²	..	..	..	..	..
	..	..	..	..	..	Scotland	2002	VCT	DT	0.4% ⁶²	..	..	..	..	..

Most recent data available were from 2002. *IDU excluded. VCT=Voluntary HIV counselling and testing centres. STI=STI clinics. OD=People with overdoses. DTC=Drug treatment centres. GP=General practitioners. NEP=Needle exchange programmes. SP=HIV seroprevalence studies. DT=HIV diagnostic testing. SR=self-reported HIV serostatus (see text).

Table 2: HIV prevalence among injecting drug users, homosexual and bisexual men, and heterosexuals with sexually transmitted infections, western Europe, 1999–2002

HIV and its complications.^{94,95} The effect of the African epidemic on national HIV situations differs between European countries. The implications have been especially great in the UK, due to this country's close links with countries of southern and eastern Africa, the most severely affected region in the world.⁹⁶

Surveillance data show that most HIV infections diagnosed in migrants were probably acquired in their country of origin. In the UK, three-quarters of heterosexual infections diagnosed in 2002 were probably acquired in Africa.²⁹ In Germany, the number of new HIV diagnoses increased in 2002 among heterosexuals originating from countries with generalised HIV epidemics, most of whom were believed to have been infected in their countries of origin.^{41,84} In Sweden, more than 80% of reported HIV infections acquired through heterosexual contact were probably acquired abroad.⁹⁷ In Denmark, immigrants accounted for 37% (105 of 281) of all HIV infections diagnosed in 2002 and for 59% (78 of 132) of those in people infected through heterosexual contact; most seropositive immigrants had been infected abroad.⁴⁷ In Belgium, 73% (4016 of 5515) of HIV infections ever diagnosed in heterosexually infected people were in non-Belgian individuals—mostly African people.⁹⁸

To determine when, where, and how HIV transmission has occurred is often difficult and further hindered where language or cultural barriers exist. Most HIV infected migrants are unaware of their HIV status and are diagnosed only when they become symptomatic or during pregnancy. Their reason for migrating to western Europe is therefore not connected with seeking HIV treatment, although this may sometimes happen. In France, in a study among 280 HIV-infected African people seen in the hospitals of the Paris area, health care was the reason for migrating to France for 27% of those who migrated since 1999, compared with 2% of those who arrived earlier.⁹⁹

Prostitutes

Data on HIV prevalence among prostitutes are fairly sparse and often based on small sample sizes. This scarcity of information probably indicates the difficulty in reaching this population, but might also be due in part to earlier findings in western Europe, where prevalence remained low among non-injecting drug user female prostitutes and prostitution appeared to have had little effect on the spread of the epidemic.¹⁰⁰ The limited more recent data tend to confirm that in western Europe, HIV infection among female prostitutes remains highly associated with injecting drug use. Prevalence is generally less than 2%, except in settings where most HIV-infected prostitutes seem to be injecting drug users.⁴⁶ Other subgroups of prostitutes at increased risk for HIV include male,

transvestite, and migrant prostitutes.^{46,101–105} Increasing numbers of prostitutes in western Europe have come from eastern Europe where HIV has spread rapidly since 1996.¹⁰⁶ The few available data on HIV among prostitutes in eastern Europe suggest that prevalence levels are currently relatively low (below 2%) except in some Russian cities, where levels around 15% were found among both drug using and non-drug-using prostitutes.⁴⁶

Other heterosexuals at high risk

Heterosexual transmission of HIV has remained largely concentrated in specific subgroups of the population and HIV has not spread into the general population as may have been feared at the beginning of the epidemic. This probably results from wide-ranging information and prevention campaigns but also from prevailing patterns of sexual networks in western Europe. From a public health perspective, the difficulty is to define and reach the subgroups of high-risk heterosexuals, including sexual partners of people belonging to the traditional risk groups, young people, people with multiple sex partners, and people with sexually transmitted infections. These people may not perceive their risk for HIV, and those infected with HIV are often diagnosed very late.

In the 12 countries with available information, during 1997–2002, a total of 7196 heterosexually acquired HIV infections were diagnosed in people who were not from countries with generalised HIV epidemics, with a 34% increase between 1997 (1068 cases) and 2002 (1434 cases, figure 2). Among the 7196 cases, 3273 (45%) were acquired through heterosexual contact with a bisexual man (217 cases), an injecting drug user (476), a recipient of blood or blood products (65), a person originating from a country with a generalised HIV epidemic (1798), or a partner known to be HIV infected but not belonging to the previous categories (717). In the remaining 3923 (55%) cases, information on the sex partner was not available (EuroHIV, unpublished data). Numbers were too few for meaningful analyses by country. In the UK, there has been a steady increase in diagnoses of HIV infection in persons infected within the UK (from 147 in 1998 to 275 in 2002), but most of these individuals were probably infected through partners who acquired their infection outside Europe.²⁹

Because heterosexual men and women with sexually transmitted infections other than HIV are at increased risk of HIV infection, monitoring HIV prevalence among patients attending sexual health clinics might provide an early indication of the spread of HIV into a wider heterosexual population. A recent review of HIV prevalence data among such patients indicates that, in western Europe, among heterosexual men and women who are not injecting drug users, the highest reported rates of HIV are among patients in Italy, where

prevalence appears to have increased from a stable level of around 2% in 1990–1996 to 3–7% in 1997–2002, and in Switzerland (2–4% in some years, with signs of a possible recent increase; table 2).¹⁴ However, an analysis in the early years of the Swiss study showed that heterosexual people with fewer sex partners were more likely than those with more partners to refuse HIV testing, suggesting that prevalence among heterosexuals might be overestimated.¹⁰⁷ In Spain, overall prevalence was 2.5% in 1998, but decreased thereafter. Elsewhere, prevalence was less than 2% (mostly less than 1%), with no clear trends. In the UK, levels were higher in London than in the rest of the country, but were still less than 1% in most years.

Emerging features and challenges

As the epidemic has matured, patterns of HIV transmission have changed and new populations have become affected, with an increasing proportion of people infected through unprotected heterosexual intercourse. At the same time, migration of HIV-infected people from sub-Saharan Africa is having an increasing effect on the HIV situation in western Europe.¹⁴ After a long period of falling incidence, HIV transmission, may now be increasing among homosexual and bisexual men. The public health challenges are to provide early and effective treatment and care to all HIV-infected people, to prevent further transmission, and to reduce the repercussions of HIV. To meet these challenges, it is essential to ensure effective surveillance to monitor the epidemiological situation, and to direct and improve public health interventions.

Reporting of new HIV diagnoses, now implemented in most countries, will increasingly become a key indicator to monitor the HIV situation in western Europe. At the same time, biological surveillance should be complemented by behavioural surveillance, which is essential to provide early warning signs of potential spread of HIV and to monitor behavioural interventions.¹⁰⁸ Incidence studies based on STARHS or other assays that can identify recent infections should be promoted in Europe and, where feasible, integrated into surveillance systems.^{86,109–111} In France, blood specimens from all people with newly diagnosed HIV infections (if informed consent is given) are now tested to assess whether the infection is recent and to estimate nationwide HIV incidence.³⁷ As treatment becomes more widespread, transmission of HIV strains resistant to antiretroviral drugs might increase. Available data show prevalences of drug resistance among newly HIV-infected individuals ranging from 5% to 15% in Europe.¹¹² However, methodological heterogeneity and problems in study design make it difficult to compare results between different surveys and to draw firm conclusions.¹¹² Improved surveillance

will be needed to assess and to monitor the prevalence of resistant strains among new infections. The challenge in implementing such surveillance schemes will be to obtain biological samples that are representative of the new HIV infections, beyond those that are diagnosed in the centres of excellence. Long-term side-effects of highly active antiretroviral treatment, and the occurrence of cancers among patients receiving treatment, also need to be monitored through studies with long-term follow-up and population-based surveillance.^{113–115}

Renewed safer sex campaigns targeting homosexual and bisexual men are urgently needed. At the same time, it is crucial to assess whether—and to what extent—HIV incidence is actually increasing in this community, and to determine the reasons for any resurgence. Various factors that might affect HIV transmission at the population level include behaviour, demographics, and two biological factors working in opposite directions—sexually transmitted infections and antiretroviral treatment.^{77,81} Men who are not infected with HIV might be less concerned about acquiring a disease that could now be perceived as chronic, manageable, and survivable, and HIV-infected men might be less concerned about transmitting such a disease.^{56,73,74,116} People infected with HIV who believe that low viral load renders them non-infectious might stop using condoms.^{74,117} Furthermore, people at risk of infection might increasingly turn to prophylactic treatment after possible sexual exposures to the virus.¹¹⁸ Additionally, as treatment options enable people to live longer and feel healthier, they might become more sexually active. Although the number of sexually active homosexual and bisexual men infected with HIV is probably rising because of decreasing morbidity and mortality, the number who are uninfected—and thus susceptible to infection—might also be increasing as a result of a new generation of young men, who did not experience the initial AIDS epidemic, growing up.¹¹⁹

Migrants are frequently affected by strong barriers to HIV prevention and care, including cultural, socioeconomic, linguistic, and administrative or legal barriers—and, more generally, they might have to face stigmatisation and social hostility. HIV/AIDS prevention, treatment, and care programmes should be adapted to reach migrant populations. The fight against HIV/AIDS should be global and include the provision of antiretroviral treatments to poor nations.¹²⁰ Surveillance and research among migrant populations should be improved, and collaborative partnerships with local communities should be created. The first challenge is to better define the migrant populations at increased risk of HIV. Migrant is a broad term that relates to many different situations regarding the resident or legal status, the length of stay, the reason for migration, and the place of origin. Publication of

data will give greater visibility to the HIV problem among at-risk migrant communities and will help to set up public health interventions. But it might also promote xenophobia and further stigmatisation, and avoiding this problem is part of the challenge.

More than ever, in the era of highly effective antiretroviral treatment, early diagnosis and treatment of infected individuals is essential to HIV prevention, care, and control. A large proportion of people infected with HIV remain unaware of their infection—31% is the estimate for the UK. These people will not benefit from effective treatment and will continue, unknowingly, to transmit HIV to others. Furthermore, recently infected people have high viral loads, which increase the risk of transmission. People who are known to be seropositive are encouraged to behave in ways that reduce the likelihood of transmitting the virus and to be accountable for their actions, but prevention efforts should also aim to provide the social conditions that encourage and reinforce safe behaviour.¹¹⁶

Conflict of interest statement

We have no conflict of interest.

Acknowledgments

We thank the national co-ordinators of the surveillance of HIV/AIDS who provided much of the data used in this review: Austria, JP Klein; Belgium, A Sasse, Denmark, E Smith; Finland, P Holmström; France, C Semaille; Germany, O Hamouda; Greece, M Arvanitis; Iceland, H Briem; Ireland, K O'Donnell; Italy, B Suligoi; Luxembourg, P Huberty-Kraus; Netherlands, E Op de Coul; Norway, P Aavitsland; Portugal, M T Paixao; Spain, I Noguer; Sweden, M Arneborn; Switzerland, M Gebhardt; UK, B Evans. EuroHIV was funded by the Directorate General for Health and Consumer Protection (DG SANCO) of the European Commission during 1996–2003 (last contract number: SPC.2002409).

References

- 1 du Bois RM, Branthwaite MA, Mikhail JR, Batten JC. *Pneumocystis carinii* and cytomegalovirus infections. *Lancet* 1981; **2**: 1339.
- 2 Rozenbaum W, Coulaud JP, Saimot AG, Klatzmann D, Mayaud C, Carette MF. Multiple opportunistic infection in a male homosexual in France. *Lancet* 1982; **1**: 572–73.
- 3 Vilaseca J, Arnau JM, Bacardi R, Mieras C, Serrano A, Navarro C. Kaposi's sarcoma and toxoplasma gondii brain abscess in a Spanish homosexual. *Lancet* 1982; **1**: 572.
- 4 WHO. Acquired immunodeficiency syndrome (AIDS). Situation in Europe as of 31 December 1985. *Wkly Epidemiol Rec* 1986; **61**: 125–28.
- 5 Downs AM, Heisterkamp SH, Rava L, Houweling J, Jager JC, Hamers FF. Back-calculation by birth cohort, incorporating age-specific disease progression, pre-AIDS mortality and change in European AIDS case definition. European Union Concerted Action on Multinational AIDS Scenarios. *AIDS* 2000; **14**: 2179–89.
- 6 Dubois-Arber F, Paccaud F. Assessing AIDS/HIV prevention: what do we know in Europe? *Soz Praventivmed* 1994; **39** (suppl 1): S3–13.
- 7 Pollak M, Dür W, Vincineau M, et al. Evaluating AIDS prevention for men having sex with men: the West European experience. *Soz Praventivmed* 1994; **39** (suppl 1): S47–60.
- 8 Rezza G, Rota MC, Buning E, Hausser D, O'Hare P, Power R. Assessing HIV prevention among injecting drug users in European Community countries. *Soz Praventivmed* 1994; **39** (suppl 1): S61–78.
- 9 Hamers FF. AIDS associated with blood transfusion and haemophilia in Europe. *BMJ* 1996; **312**: 847–48.
- 10 Pillonel J, Laperche S, Saura C, Desenclos JC, Courouze AM. Trends in residual risk of transfusion-transmitted viral infections in France between 1992 and 2000. *Transfusion* 2000; **42**: 966–72.
- 11 Alvarez M, Oyonarte S, Rodriguez PM, Hernandez JM. Estimated risk of transfusion-transmitted viral infections in Spain. *Transfusion* 2000; **42**: 994–98.
- 12 Velati C, Romana L, Baruffi L, Pappalettera M, Carreri V, Zanetti AR. Residual risk of transfusion-transmitted HCV and HIV infections by antibody-screened blood in Italy. *Transfusion* 2000; **42**: 983–93.
- 13 Soldan K, Barbara JA, Ramsay ME, Hall AJ. Estimation of the risk of hepatitis B virus, hepatitis C virus and human immunodeficiency virus infectious donations entering the blood supply in England, 1993–2001. *Vox Sang* 2003; **84**: 274–86.
- 14 European Centre for the Epidemiological Monitoring of AIDS. HIV/AIDS surveillance in Europe, mid-year report, 2003. Saint-Maurice: Institut de Veille Sanitaire, 2003, number 69. http://www.eurohiv.org/reports/report_69/pdf/rapport_eurohiv_69.pdf (accessed 10 April 2004).
- 15 Rey D, Obadia Y, Carrieri MP, Moatti JP. HIV screening for pregnant women in south eastern France: evolution 1992–1994–1996. *Eur J Obstet Gynecol Reprod Biol* 1998; **76**: 5–9.
- 16 D'Ubaldo C, Vucetich A, Pardi G, Ippolito G, Puro V. Testing for HIV infection in pregnant women at the obstetric centers in Italy. *Minerva Ginecol* 1999; **51**: 7–14. In Italian.
- 17 Lindgren S, Bohlin AB, Forsgren M, et al. Screening for HIV-1 antibodies in pregnancy: results from the Swedish national programme. *BMJ* 1993; **307**: 1447–51.
- 18 Kvam BM, Aavitsland P, Nilsen O, Lystad A. Attitude of pregnant women to routine voluntary antenatal HIV testing. *Tidsskr Nor Laegeforen* 2000; **120**: 2895–900. In Norwegian.
- 19 Health Service Circular. Reducing mother to baby transmission of HIV (HSC 1999/183). London: NHS Executive, 1999.
- 20 European Collaborative Study. HIV-infected pregnant women and vertical transmission in Europe since 1986. *AIDS* 2001; **15**: 761–770.
- 21 Mocroft A, Brettle R, Kirk O, et al. Changes in the cause of death among HIV positive subjects across Europe: results from the EuroSIDA study. *AIDS* 2002; **16**: 1663–71.
- 22 Lot F, Pillonel J, Pinget R, Cazein F, Gouezel P, Laporte A. Diminution brutale du nombre de cas de sida: rôle des nouvelles stratégies? *Bulletin Epidemiologique Hebdomadaire* 1997; **11**: 43–45. <http://www.invs.sante.fr/beh/1997/9711/index.html> (accessed Jan 6, 2004). In French.
- 23 Gebhardt M, Rickenbach M, Egger M. Impact of antiretroviral combination therapies on AIDS surveillance reports in Switzerland. Swiss HIV Cohort Study. *AIDS* 1998; **12**: 1195–201.
- 24 Aalen OO, Farewell VT, De Angelis D, Day NE, Gill ON. New therapy explains the fall in AIDS incidence with a substantial rise in number of persons on treatment expected. *AIDS* 1999; **13**: 103–08.
- 25 Hamers FF, Downs AM, Infuso A, Brunet JB. Diversity of the HIV/AIDS epidemic in Europe. *AIDS* 1998; **12** (suppl A): S63–70.
- 26 UNAIDS/WHO. AIDS epidemic update: December 2003. Geneva: UNAIDS, 2003. <http://www.unaids.org/Unaid/EN/Resources/Publications/Corporate-publications/AIDS+epidemic+update++December+2003.asp> (accessed Jan 14, 2004).
- 27 Yazdanpanah Y, Goldie SJ, Losina E, et al. Lifetime cost of HIV care in France during the era of highly active antiretroviral therapy. *Antivir Ther* 2002; **7**: 257–66.
- 28 Miners AH, Sabin CA, Trueman P, et al. Assessing the cost-effectiveness of HAART for adults with HIV in England. *HIV Med* 2001; **2**: 52–58.
- 29 Health Protection Agency, SCIEH, ISD, National Public Health Service for Wales, CDSC Northern Ireland and the UASSG. Renewing the focus. HIV and other sexually transmitted infections in the United Kingdom in 2002. London: Health Protection Agency, 2003. http://www.hpa.org.uk/infections/topics_az/hiv_and_sti/publications/annual2003/annual2003.pdf (accessed Jan 26, 2004).
- 30 Hamers FF, Infuso A, Alix J, Downs AM. Current situation and regional perspective of HIV/AIDS surveillance in Europe. *J Acquir Immune Defic Syndr* 2003; **32** (suppl 1): S39–48.

- 31 European Monitoring Centre for Drugs and Drug Addiction. Annual Report 2003. The state of the drugs problem in the European Union and Norway. Lisbon: European Monitoring Centre for Drugs and Drug Addiction, 2003. <http://annualreport.emcdda.eu.int/en/home-en.html> (accessed Jan 19, 2004).
- 32 UNAIDS. Report on the global HIV/AIDS epidemic. July 2002. Geneva: UNAIDS, 2002. http://www.unaids.org/Unaids/EN/Resources/Publications/Corporate+publications/Report+on+the+global+HIV_AIDS+epidemic+2002+.asp (accessed Jan 14, 2004).
- 33 Robert Koch Institut. Zur entwicklung der HIV-epidemie in Deutschland. *Epidemiologisches Bulletin* 2003; 48/2003: 395–97. http://www.rki.de/INFEKT/EPIBULL/2003/48_03.PDF (accessed Jan 30, 2004).
- 34 United Nations Population Division. World population prospects: the 2000 revision. New York: United Nations, 2001.
- 35 Gras L, van Sighem A, van Valkengoed I, Zaheri S, de Wolf F, on behalf of the Netherlands collaborative HIV treatment centres. Monitoring of human immunodeficiency virus (HIV) infection in the Netherlands, 2003. Amsterdam: HIV Monitoring Foundation, 2003.
- 36 Op de Coul EL, van Valkengoed IG, van Sighem AI, de Wolf F, van de Laar MJ. HIV and AIDS in the Netherlands. 1 December 2003. RIVM rapport 441100018. Bilthoven; RIVM, 2003. <http://www.rivm.nl/bibliotheek/rapporten/441100018.pdf> (accessed Jan 27, 2004).
- 37 Semaille C. Compulsory notification of HIV infection within a new system for anonymous reporting of notifiable diseases in France. *Eurosurveillance Weekly* 2003; 7: 030320. <http://www.eurosurveillance.org/ew/2003/030320.asp#4> (accessed Jan 26, 2004).
- 38 Suligoi B, Pezzotti P, Boros S, Urciuoli R, Rezza G, and the HIV Study Group. Epidemiological changes in AIDS and HIV infection in Italy. *Scand J Infect Dis Suppl* 2003; 35 (suppl 106): 12–16.
- 39 Sasse A, Liesnard C, van der Groen G, et al. Recent increase in diagnoses of HIV infections based on surveillance system data in Belgium. *AIDS* 2000; 14: 2798–800.
- 40 National Disease Surveillance Centre (NDSC). National Disease Surveillance Centre Annual Report 2002. Dublin: National Disease Surveillance Centre, 2003. <http://www.ndsc.ie/d813.PDF> (accessed Jan 12, 2004).
- 41 Hamouda O, Marcus U. Current trends in the HIV/AIDS epidemic in Germany. *Eurosurveillance Weekly* 2003; 7: 030424. <http://www.eurosurveillance.org/ew/2003/030424.asp> (accessed Jan 24, 2004).
- 42 Gebhardt M. Marked increase of positive test results in Switzerland. *Eurosurveillance Weekly* 2003; 7: 030508. <http://www.eurosurveillance.org/ew/2003/030508.asp> (accessed Jan 27, 2004).
- 43 Office Fédéral de la Santé Publique. Sida et VIH en Suisse. Situation épidémiologique à fin 2002. Berne: Office Fédéral de la Santé Publique, 2003. <http://www.bag.admin.ch/infekt/publ/wissenschaft/f/jahresb.pdf> (accessed Jan 23, 2004). In French.
- 44 Ministerio de Sanidad Y Consumo. http://www.msc.es/Diseno/enfermedades/lesiones/enfermedades_transmisibles.htm (accessed Jan 29, 2004). In Spanish.
- 45 Moreno C, Irisarri F, Urriaga M, et al. Epidemiological surveillance of HIV/AIDS infections in Navarra between 1985 and 2002. *An sis sanit Navar* 2003; 26: 269–75. In Spanish.
- 46 European Centre for the Epidemiological Monitoring of AIDS. HIV/AIDS Surveillance in Europe, End-year report, 2002. Saint-Maurice: Institut de Veille Sanitaire, 2003, number 68. http://www.eurohiv.org/reports/report_68/pdf/report_eurohiv_68.pdf (accessed Jan 13, 2004).
- 47 Staten Serum Institut. HIV/AIDS Annual Report 2002. EPI-NEWS No.34 2003. National surveillance of communicable diseases. Copenhagen: Staten Serum Institut, 2003. http://www.ssi.dk/graphics/en/news/epinews/2003/pdf/2003_34_hiv aids.pdf (accessed Jan 13, 2004).
- 48 Castilla J, Sobrino P, De La Fuente L, Noguera I, Guerra L, Parras F. Late diagnosis of HIV infection in the era of highly active antiretroviral therapy: consequences for AIDS incidence. *AIDS* 2002; 16: 1945–51.
- 49 EACS Euroguidelines Group. European guidelines for the clinical management and treatment of HIV-infected adults in Europe. *AIDS* 2003; 17 (suppl 2): S3–26.
- 50 Ministerio de Sanidad y Consumo. Encuesta hospitalaria de pacientes VIH/SIDA resultados 2002 y análisis de la evolución 1995–2002. Madrid: Secretaria del Plan Nacional sobre el Sida, 2003. http://www.msc.es/profesional/preProSalud/sida/pdfs/Hospitales_2002.pdf (accessed Jan 28, 2003).
- 51 Mocroft A, Madge S, Johnson AM, et al. Comparison of exposure groups in the EuroSIDA study: starting highly active antiretroviral therapy (HAART), response to HAART, and survival. *J Acquir Immune Defic Syndr* 1999; 22: 369–78.
- 52 Rapiti E, Porta D, Forastiere F, Fusco D, Perucci CA. Socioeconomic status and survival of persons with AIDS before and after the introduction of highly active antiretroviral therapy. Lazio AIDS Surveillance Collaborative Group. *Epidemiology* 2000; 11: 496–501.
- 53 van Asten LC, Boufassa F, Schiffer V, et al. Limited effect of highly active antiretroviral therapy among HIV-positive injecting drug users on the population level. *Eur J Public Health* 2003; 13: 347–49.
- 54 Blaxhult A, Mocroft A, Phillips A, et al. Does European or non-European origin influence health care and prognosis for HIV patients in Europe? The EuroSIDA Study Group. *HIV Med* 1999; 1: 2–9.
- 55 European Centre for the Epidemiological Monitoring of AIDS. HIV/AIDS Surveillance in Europe, mid-year report 2002, number 67. Saint-Maurice: Institut de Veille Sanitaire, 2002. http://www.eurohiv.org/reports/report_67/pdf/report_eurohiv_67.pdf (accessed Jan 23, 2004).
- 56 Adam P, Hauet E, Caron C. Increasing risk taking and IST among gays. Preliminary results of the gay press survey 2000. Saint-Maurice: Institut de Veille Sanitaire, 2001. http://www.invs.sante.fr/publications/rap_press_gay_1101/rapport_presse_gay.pdf (accessed Jan 23, 2004).
- 57 Observatoire français des drogues et des toxicomanies. Report to the EMCDDA by the Reitox National Focal Point. France drug situation 2002. Paris: OFDT, 2003. <http://www.ofdt.fr/BDD/publications/docs/nr03fr.pdf> (accessed 30 January 2004). In French.
- 58 Emmanuelli J, Jauffret-Roustide M, Barin F. Epidémiologie du VHC chez les usagers de drogues, France, 1993–2002. *Bulletin Epidemiologique Hebdomadaire* 2003; 16–17/2003: 97–99. http://www.invs.sante.fr/beh/2003/16_17/beh_16_17_2003.pdf (accessed Jan 28, 2003). In French.
- 59 Op de Coul EL, Fennema JS, van den Hoek JA, et al. HIV-infecties en aids in Nederland: prevalentie en incidentie, 1987–2002. Capita selecta on HIV/AIDS p 1–9. Alphen aan de Rijn: Van Zuiden Communications BV, 2003. In Dutch.
- 60 Centre d'Estudis Epidemiològics sobre l'HIV/Sida de Catalunya (CEESCAT). SIVES 2001 Integrated HIV/AIDS surveillance system of Catalonia. Barcelona: Departament de Sanitat i Seguretat Social, 2001. <http://www.gencat.net/sanitat/depans/units/sanitat/pdf/sivesing.pdf> (accessed Jan 30, 2004).
- 61 Health Protection Agency, Institute of Child Health, London, SCIEH. Supplementary data tables of the Unlinked Anonymous Prevalence Monitoring Programme: data to the end of 2002. London: Health Protection Agency, December 2003. http://www.hpa.org.uk/infections/topics_az/hiv_and_sti/hiv/epidemiology/ua.htm (accessed Jan 30, 2004).
- 62 Health Protection Agency, SCIEH, National Public Health Service for Wales, CDSC Northern Ireland, CRDHB, UAASSG. Shooting Up: Infections among injecting drug users in the United Kingdom 2002. London: Health Protection Agency, 2003. <http://www.show.scot.nhs.uk/scieh/documents/IDUAnnReport/ShootingUp.pdf> (accessed Jan, 2004).
- 63 Nicoll A, Hamers FF. Are trends of HIV, gonorrhoea and syphilis worsening in western Europe? *BMJ* 2002; 324: 1324–27.
- 64 Martin IM, Ison CA, London Gonococcal Working Group. Rise in gonorrhoea in London, UK. *Lancet* 2000; 355: 623.
- 65 Fenton KA, Rogers PA, Simms I, Maguire H, Catchpole M. Increasing gonorrhoea reports—not only in London. *Lancet* 2000; 355: 1907.

- 66 Stolte IG, Dukers NH, de Wit JB, Fennema JS, Coutinho RA. Increase in sexually transmitted infections among homosexual men in Amsterdam in relation to HAART. *Sex Transm Infect* 2001; **77**: 184–86.
- 67 Johansen JD, Smith E. Gonorrhoea in Denmark: high incidence among HIV-infected men who have sex with men. *Acta Derm Venereol* 2002; **82**: 365–68.
- 68 Couturier E, Michel A, Basse-Guérineau AL, Semaille C. Surveillance of syphilis in mainland France, 2000–2002. *Bull Epidemiol Hebdomadaire* 2004; **3**/2004: 9–12. http://www.invs.sante.fr/beh/2004/03/beh_03_2004.pdf (accessed Jan 17, 2004). In French.
- 69 Cusini M, Ghislanzoni M, Bernardi C, et al. Syphilis outbreak in Milan, Italy. *Sex Transm Infect* 2004; **80**: 154.
- 70 Herida M, Sednaoui P, Goulet V. Gonorrhoea surveillance system in France: 1986–2000. *Sex Transm Dis* 2004; **31**: 209–14.
- 71 Hart GJ, Flowers P, Der GJ, Frankis JS. Homosexual men's HIV related sexual risk behaviour in Scotland. *Sex Transm Infect* 1999; **75**: 242–46.
- 72 Dodds JP, Nardone A, Mercey DE, Johnson AM. Increase in high risk sexual behaviour among homosexual men, London 1996–8: cross sectional, questionnaire study. *BMJ* 2000; **320**: 1510–11.
- 73 Elford J, Bolding G, Maguire M, Sherr L. Combination therapies for HIV and sexual risk behavior among gay men. *J Acquir Immune Defic Syndr* 2000; **23**: 266–71.
- 74 Dukers NH, Goudsmit J, de Wit JB, Prins M, Weverling GJ, Coutinho RA. Sexual risk behaviour relates to the virological and immunological improvements during highly active antiretroviral therapy in HIV-1 infection. *AIDS* 2001; **15**: 369–78.
- 75 Dubois-Arber F, Moreau-Gruet F, Jeannin A. Men having sex with men and HIV prevention in Switzerland: 1987–2000. *Eurosurveillance* 2002; **7**: 18–18.
- 76 Katz MH, Schwarcz SK, Kellogg TA, et al. Impact of highly active antiretroviral treatment on HIV seroincidence among men who have sex with men: San Francisco. *Am J Public Health* 2002; **92**: 388–94.
- 77 Fleming DT, Wasserheit JN. From epidemiological synergy to public health policy and practice: the contribution of other sexually transmitted diseases to sexual transmission of HIV infection. *Sex Transm Infect* 1999; **75**: 3–17.
- 78 Grulich A. HIV risk behaviour in gay men: on the rise? *BMJ* 2000; **320**: 1487–88.
- 79 Wolitski RJ, Valdiserri RO, Denning PH, Levine WC. Are we headed for a resurgence of the HIV epidemic among men who have sex with men? *Am J Public Health* 2001; **91**: 883–88.
- 80 Royce RA, Sena A, Cates W, Cohen MS. Sexual transmission of HIV. *N Engl J Med* 1997; **336**: 1072–78.
- 81 Vernazza PL, Eron JJ, Fiscus SA, Cohen MS. Sexual transmission of HIV: infectiousness and prevention. *AIDS* 1999; **13**: 155–66.
- 82 Vernazza PL, Troiani L, Flepp MJ, et al. Potent antiretroviral treatment of HIV-infection results in suppression of the seminal shedding of HIV. The Swiss HIV Cohort Study. *AIDS* 2000; **14**: 117–21.
- 83 Blower SM, Gershengorn HB, Grant RM. A tale of two futures: HIV and antiretroviral therapy in San Francisco. *Science* 2000; **92**: 388–94.
- 84 Robert Koch Institut. HIV Infektionen und AIDS-erkrankungen in Deutschland aktuelle epidemiologische daten (Stand vom 30.6.2003). *Epidemiologisches Bulletin* 2003; **B**/2003: 1–16. http://www.rki.de/INFEKT/EPIDBULL/2003/B_03.PDF (accessed Jan 12, 2004). In German.
- 85 del Romero J, Castilla J, Garcia S, Clavo P, Ballesteros J, Rodriguez C. Time trend in incidence of HIV seroconversion among homosexual men repeatedly tested in Madrid, 1988–2000. *AIDS* 2001; **15**: 1319–21.
- 86 Janssen RS, Satten AG, Stramer SL, et al. New strategy to detect early HIV-1 infection for use in incidence estimates and for clinical and prevention purposes. *JAMA* 1998; **280**: 42–48.
- 87 Dukers NH, Spaargaren J, Geskus RB, Beijnen J, Coutinho RA, Fennema HS. HIV incidence on the increase among homosexual men attending an Amsterdam sexually transmitted disease clinic: using a novel approach for detecting recent infections. *AIDS* 2002; **16**: 19–24.
- 88 Murphy G, Charlett A, Jordan LF, Osner N, Gill ON, Parry JV. HIV incidence appears constant in men who have sex with men despite widespread use of effective antiretroviral therapy. *AIDS* 2004; **18**: 265–72.
- 89 Hamers FF, Batter V, Downs AM, Alix J, Cazein F, Brunet JB. The HIV epidemic associated with injecting drug use in Europe: geographic and time trends. *AIDS* 1997; **11**: 1365–74.
- 90 de la Fuente L, Barrio G, Royuela L, Bravo MJ, The Spanish Group for the Study of the Route of Heroin Administration. The transition from injecting to smoking heroin in three Spanish cities. *Addiction* 1997; **92**: 1749–63.
- 91 Strang J, Griffiths P, Powis B, Gossop M. Heroin chasers and heroin injectors: differences observed in a community sample in London, UK. *Am J Addict* 1999; **8**: 148–60.
- 92 Smyth BP, O'Brien M, Barry J. Trends in treated opiate misuse in Dublin: the emergence of chasing the dragon. *Addiction* 2000; **95**: 1217–23.
- 93 Welp EA, Lodder AC, Langendam MW, Coutinho RA, van Ameijden EJ. HIV prevalence and risk behaviour in young drug users in Amsterdam. *AIDS* 2002; **16**: 1279–84.
- 94 Haour-Knipe M, Fleury F, Dubois-Arber F. HIV/AIDS prevention for migrants and ethnic minorities: three phases of evaluation. *Soc Sci Med* 1999; **49**: 1357–72.
- 95 Dray-Spira R, Lert F. Social health inequalities during the course of chronic HIV disease in the era of highly active antiretroviral therapy. *AIDS* 2003; **17**: 283–90.
- 96 Sinka K, Mortimer J, Evans B, Morgan D. Impact of the HIV epidemic in sub-Saharan Africa on the pattern of HIV in the UK. *AIDS* 2003; **17**: 1683–90.
- 97 Swedish Institute for Infectious Disease Control. Communicable diseases in Sweden 2001. Stockholm: Karl Ekdahl, 2002. <http://www.smittskyddsinstytutet.se/upload/Publikationer/Repor t2001.pdf> (accessed Jan 30, 2004).
- 98 Institut Scientifique de Santé Publique. Le sida en Belgique. Situation au 30 juin 2003. Rapport semestriel No 57. Brussels: Institut Scientifique de Santé Publique, 2003. http://www.iph.fgov.be/epidemie/epifr/aidsfr/rap_sem.pdf (accessed Jan 6, 2004). In French.
- 99 Lot F, Larsen C, Valin N, Gouëzel P, Blanchon T, Laporte A. Parcours sociomédical des personnes originaires d'Afrique subsaharienne atteintes par le VIH, prises en charges dans les hôpitaux d'Ile de France, 2002. *Bull Epidemiol Hebdomadaire* 2004; **5**/2004: 17–20. http://www.invs.sante.fr/beh/2004/05/beh_05_2004.pdf (accessed Jan 29, 2004). In French.
- 100 European Working Group on HIV Infection in Female Prostitutes. HIV infection in European female sex workers: epidemiological link with use of petroleum-based lubricants. *AIDS* 1993; **7**: 401–08.
- 101 Spina M, Mancuso S, Sinicco A, et al. Human immunodeficiency virus seroprevalence and condom use among female sex workers in Italy. *Sex Transm Dis* 1998; **25**: 451–54.
- 102 Spizzichino L, Zaccarelli M, Rezza G, Ippolito G, Antinori A, Gattari P. HIV infection among foreign transsexual sex workers in Rome: prevalence, behavior patterns, and seroconversion rates. *Sex Transm Dis* 2001; **28**: 405–11.
- 103 D'Antuono A, Andalo F, Carla EM, De Tommaso S. Prevalence of STDs and HIV infection among immigrant sex workers attending an STD centre in Bologna, Italy. *Sex Transm Infect* 2001; **77**: 220.
- 104 Belza MJ, Llacer A, Mora R, Morales M, Castilla J, de la Fuente L. Sociodemographic characteristics and HIV risk behaviour patterns of male sex workers in Madrid, Spain. *AIDS Care* 2001; **13**: 677–82.
- 105 Verster A, Davoli M, Camposeragna A, Valeri C, Perucci CA. Prevalence of HIV infection and risk behaviour among street prostitutes in Rome, 1997–1998. *AIDS Care* 2001; **13**: 367–72.
- 106 Hamers FF, Downs AM. HIV in central and eastern Europe. *Lancet* 2003; **361**: 1035–44.
- 107 Paget WJ, Zwahlen M, Eichmann AR, and the Swiss Network of Dermatovenereology Policlinics. Voluntary confidential HIV testing of STD patients in Switzerland, 1990–1995: HIV test refusers cause different biases on HIV prevalences in heterosexuals and homo/bisexuals. *Genitourin Med* 1997; **73**: 444–447.

- 108 WHO and UNAIDS. Guidelines for second generation surveillance HIV surveillance. WHO/CDS/CSR/EDC/2000.5, UNAIDS/00.03E. Geneva: WHO/UNAIDS, 2000. http://www.unaids.org/EN/resources/epidemiology/epi_recent_publications/secondgensurveillance2000.asp (accessed Jun 15, 2004)
- 109 Rawal BD, Degula A, Lebedeva L, et al. Development of a new less-sensitive enzyme immunoassay for detection of early HIV-1 infection. *J Acquir Immune Defic Syndr* 2003; **33**: 349–55.
- 110 Parekh BS, Kennedy MS, Dobbs T, et al. Quantitative detection of increasing HIV type 1 antibodies after seroconversion: a simple assay for detecting recent HIV infection and for estimating incidence. *AIDS Res Hum Retroviruses* 2002; **18**: 295–307.
- 111 Suligoi B, Massi M, Galli C, et al. Identifying recent HIV infections using the avidity index and an automated enzyme immunoassay. *J Acquir Immune Defic Syndr* 2002; **32**: 424–28.
- 112 Girardi E. Epidemiological aspects of transmitted HIV drug resistance. *Scand J Infect Dis Suppl* 2003; **35** (suppl 106): 17–20.
- 113 Lederman MM, Valdez H. Immune restoration with antiretroviral therapies: implications for clinical management. *JAMA* 2000; **284**: 223–28.
- 114 Grulich AE, Li Y, McDonald A, Correll PK, Law MG, Kaldor JM. Rates of non-AIDS-defining cancers in people with HIV infection before and after AIDS diagnosis. *AIDS* 2002; **16**: 1155–61.
- 115 Herida M, Mary-Krause M, Kaphan R, et al. Incidence of non-AIDS-defining cancers before and during the highly active antiretroviral therapy era in a cohort of human immunodeficiency virus-infected patients. *J Clin Oncol* 2003; **21**: 3447–53.
- 116 Marks G, Burris S, Peterman TA. Reducing sexual transmission of HIV from those who know they are infected: the need for personal and collective responsibility. *AIDS* 1999; **13**: 297–306.
- 117 Stephenson JM, Imrie J, Davis MM, et al. Is use of antiretroviral therapy among homosexual men associated with increased risk of transmission of HIV infection? *Sex Transm Infect* 2003; **79**: 7–10.
- 118 Laporte A, Jourdan N, Bouvet E, Lamontagne F, Pillonel J, Desenclos JC. Post-exposure prophylaxis after non-occupational HIV exposure: impact of recommendations on physicians' experiences and attitudes. *AIDS* 2002; **16**: 397–405.
- 119 Levin BR, Bull JJ, Stewart FM. Epidemiology, evolution, and future of the HIV/AIDS pandemic. *Emerg Infect Dis* 2001; **7** (3 suppl): 505–11.
- 120 WHO. Treating 3 million by 2005. Making it happen. The WHO Strategy. Geneva: World Health Organization, 2003. <http://www.who.int/entity/3by5/publications/documents/isbn9241591129/en> (accessed Jan 29, 2004)