

## Infectious Disease

# Migration and HIV epidemic in Greece

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**Background:** Over the last decade, Greece has experienced a massive influx of migrants from countries in South Eastern/Central Europe, the Middle East, Asia and Africa. This study aimed to estimate the percentage and the specific characteristics of HIV-positive migrants reported in Greece, and to describe the secular trend of migrants' proportion among HIV-infected individuals. **Methods:** Secondary analysis of data reported to the Hellenic Centre for Infectious Diseases Control (HCIDC) during the years 1989–2003. **Results:** From 1989 to 2003, 6292 HIV-positive cases were reported to HCIDC. Data show that 749 people (439 males, 303 females) originated from countries other than Greece. Most HIV-positive migrants come from Sub-Saharan Africa (32.44%) and nearly 20% from Central and Eastern Europe. In the Greek population, men who have sex with men (MSM) constitute 50.47% of cases, while 16.15% are heterosexuals. The epidemic profile follows a different pattern among migrants ( $P < 0.05$ ). Heterosexual transmission accounts for 41.52% of HIV-positive reported migrants, while 19.09% are MSM. An 11% increase for each subsequent year in the rate of HIV-positive migrants reported in Greece has been estimated using a Poisson regression model fitted to the data (IR 1.11; 95% confidence interval 1.08–1.13). **Conclusions:** The results suggest an increasing trend of HIV-seropositive migrants in Greece during recent years. Group-based interventions, better access to health care and a comprehensive public approach should be applied to migrants.

**Keywords:** HIV infection, migrants, migration

Over 40 million persons worldwide are estimated to be living with HIV, the virus that causes AIDS.<sup>1</sup> Concurrently, more than 100 million persons move voluntarily within or between nations each year and almost 40 million are either internally displaced or refugees outside their own countries. An estimated 2–4 million leave their country of origin voluntarily each year, 18 million persons have fled their own countries as refugees, often moving in large groups under spectacular and horrific circumstances, and 20 million is considered to be internally displaced, having left their own communities for another within their own country, especially from rural to urban areas.<sup>2</sup>

Many studies have revealed evidence of a potential association between human mobility and the HIV epidemic,<sup>3–6</sup> especially in developing areas. The public health response to the issue of HIV and migration is usually based upon two scenarios. The first concern is that incoming migrants might already have been infected by HIV. The second refers to the relationship between structure and conditions of the migration process and HIV transmission.<sup>2</sup> While the first scenario still applies, there is an increasing belief that migrants may be more vulnerable to HIV infection than local populations. Mobile populations have higher infection rates than those who do not move, independent of the HIV prevalence at the site of departure or the site of destination.<sup>3</sup> Successful interventions should address all aspects of migrants' vulnerability to infection since human migration, whether voluntary or not, may result in the spread of HIV infection both to those who migrate and to members of the communities that receive migrants, as well as to individuals in the country of origin, if migrants return infected.

An attempt to understand the vulnerability of mobile populations to HIV must begin with an understanding of

human mobility. Human migration—people changing their place of residence permanently or temporarily—is a complex phenomenon with many different faces.<sup>3</sup> Primary factors, including political, economic and social, play a central role in population movement and mobility. Doubtless, time influences the whole process. Movement can be fast, as when someone travels by aeroplane, slow, as when moving on foot and stopping for weeks or even months along the way, or cyclical, with people leaving and returning to their places of origin once or more. Legal status is crucial, determines migrant's life and can have a tremendous influence on his or her vulnerability to HIV/AIDS.<sup>2</sup> The factors that determine the vulnerability of migrant labors include the long absence from the social control of their home environment, lack of access to medical care for sexually transmitted infections (STIs), substance use related to loneliness, and a dysfunctional symbiosis between sex work and migrant labour.<sup>3,6</sup> As for refugee populations, the violence that accompanies or precedes the move and the unhealthy and constrained social environment of refugee camps constitute a very elevated risk of HIV infection.<sup>3</sup>

Over the last decade, Greece (with a population of 11 000 000) has experienced a massive influx of people from countries in South Eastern/Central Europe, the Middle East, Asia and Africa. The collapse of economies in the former Soviet Union, civil wars in the Balkans and Greece's European Union membership make the country an attractive place to migrate, for economic reasons and due to the perception of Greece as a point of entry into Europe. According to National Statistical Data for the year 2001,<sup>7</sup> 762 191 immigrants were reported to be living in Greece, originating from over 30 different countries in the former Soviet Union, Balkans, Middle East, Africa, Far East, South Central Asia and South East Asia.

The increasing number of immigrants and the epidemiological link between HIV and migration was the motivation to estimate the percentage as well as the specific characteristics of HIV-positive migrants reported in Greece. The study also aimed to establish the secular trend of migrants' proportion among HIV-infected individuals.

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## METHODS

The Hellenic Centre for Infectious Diseases Control (HCIDC) serves as the national focus for the confronting and monitoring of communicable diseases as well as for developing and applying infectious diseases prevention and control. The HCIDC has established a national surveillance system for HIV/AIDS and we have obtained a database of all reported HIV/AIDS cases. AIDS case reporting was implemented in Greece in 1984. It is anonymous, confidential and mandatory by law. The first two characters of the name and the patient's date of birth are used as personal identifiers to achieve possible duplicate elimination. HIV case reporting was implemented in Greece in 1998. Again, this is anonymous, confidential and mandatory by law, and the first characters of name and date of birth are used as personal identifiers. Data are reported from several facilities including all 18 infectious diseases units, reference centres, general, regional and district hospitals. HIV testing is available free of charge in all national hospitals and reference centres. Data are recorded and managed by the HIV Infection Office of the HCIDC. Reporting is available in real time, although the data are presented in half-year editions.<sup>8</sup>

We abstracted data reported to HCIDC during the years 1989–2003. Information related to subject's age, gender, nationality (demographic variables), stage of HIV disease (history of AIDS-defining condition) and mode of exposure to HIV, was collected. The definition of migrant that has been used includes voluntary or economic migrants, refugees, displaced persons and individuals who move for other compelling reasons. However, it was not possible to identify exactly whether a given migrant was economic or seasonal, or belonged to a certain group such as refugees. To evaluate the effect of time as an independent factor associated with the number of HIV-infected migrants, the statistical analysis was performed using a Poisson regression model. Our analysis was also based upon  $\chi^2$ -test, *t*-test and logistic regression. Analyses were performed with Stata software (Stata Corporation, College Station, TX, USA).

## RESULTS

The cumulative number of HIV-positive persons reported in Greece from 1989 to 2003 was 6292. Among them, 5028 (79.91%) were men and 1226 (19.49%) were women. The gender was not reported for 38 (0.60%) cases. Overall, sexual transmission accounts for most HIV infections. Out of them, 2823 (44.87%) persons are men who have sex with men (MSM), while 1190 (18.91%) are men and women who have been infected through heterosexual contact. Transmission category

was reported as undetermined for 1739 (27.64%) HIV-positive cases (table 1). Among the 6292 HIV cases, 2206 individuals have been diagnosed with AIDS during the same time period, of whom 1879 (85.18%) are men and 327 (14.82%) are women.

A high percentage of cases have been reported as being Greeks (78.94%). Males account for most HIV-positive Greeks, with 4166 (83.87%) cases, while for a small percent of cases (0.28%) the gender was not identified. For 576 cases, the nationality was not identified. For 749 (11.90%) individuals that came from countries outside Greece, the gender distribution is quite different. In detail, 439 are males (58.61%) and 303 are females (40.45%). The percentage of undetermined gender cases is low (0.93%). Nationality data among migrants shows that 32.44% originate from Sub-Saharan Africa and nearly 20% from Central and Eastern Europe. The exact distribution of infected migrants according to their nationality is shown in table 2.

The transmission pattern differs between Greek natives and migrants. This difference is statistically significant ( $P < 0.05$ ). Out of 4967 Greek HIV-positive cases, 2507 (50.47%) are MSM and 802 (16.15%) have been infected through heterosexual contact. In contrast, the mode of transmission among migrants shows that 311 (41.52%) were exposed to HIV through heterosexual contact while 143 (19%) were MSM. Regarding injecting drug users, the percentage among immigrants is almost two-fold that among Greeks (7.74% versus 3.18%). The frequency of cases belonging to other transmission groups is considered low for both nationality groups. The analysis yielded the same results when we applied a logistic regression model to the data. The dependent variable has a value of 1 if a case is migrant and 0 otherwise. The independent variable is the mode of transmission. The coefficients as well as the relative odds ratios are shown in table 3. For example, the odds of a case being a migrant among HIV-positive cases reported as heterosexuals or injecting drug users is nearly  $3.5 \times$  the odds among MSM, which is the reference category.

The mean age at the time of HIV seropositivity report is 34.06 years for immigrants and is statistically different from that of Greeks (mean age 38.42 years;  $P < 0.05$ ). Females are younger at the time of report, both in the Greek population (males 38.77 versus females 37.43 years) and in that of immigrants (males 35.75 versus females 31.42 years).

An 11% increase for each subsequent year in the rate of HIV-positive migrants reported in Greece was identified after a Poisson regression model had been fitted to the data ( $n = 6049$ ) excluding those for year 2003, since the collection was not completed [IR 1.11; 95% confidence interval (CI) 1.08–1.13]. Separate analyses were performed for the period 1989–1998 (IR 1.04; 95% CI 0.99–1.09) and 1999–2002 (IR 1.14; 95%

**Table 1** Cumulative HIV-positive cases by transmission group and gender reported in Greece from 1989 to 2003

Transmission group	Males		Females		Total <sup>a</sup>	
	<i>n</i>	%	<i>n</i>	%	<i>n</i>	%
Men who have sex with men	2823	56.15	–	–	2823	44.87
Injecting drug users	177	3.52	51	4.16	229	3.64
Haemophiliacs/coagulation disorder	185	3.68	14	1.14	199	3.16
Transfusion recipients	38	0.76	33	2.69	71	1.13
Heterosexuals	435	8.65	750	61.17	1190	18.91
Mother to child	22	0.44	18	1.47	41	0.65
Undetermined	1348	26.81	360	29.36	1739	27.64
Total	5028	100.0	1226	100.0	6292	100.0

a: Including cases of unknown gender.

**Table 2.** Distribution of HIV positive migrants reported in Greece by their nationality for the years 1989–2003

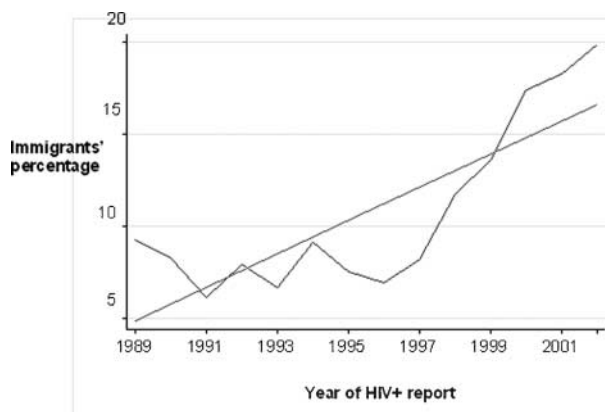
Nationality	<i>n</i>	%
Western Europe	119	15.89
Central Europe	107	14.29
Eastern Europe	40	5.34
Sub-Saharan Africa	243	32.44
East Asia and Pacific	1	0.13
Australia and New Zealand	1	0.13
South and South East Africa	37	4.94
North Africa and Middle East	43	5.74
North America	20	2.67
Caribbean	2	0.27
Latin America	18	2.40
Foreigner, unknown nationality	118	15.75
Total	749	100.00

CI 1.05–1.23). The increase in the rate of HIV positive immigrants is steeper in the second period after the implementation of the HIV case reporting. The secular trend is depicted more clearly at figure 1.

## DISCUSSION

The study suggests that over the last decade, there has been an increasing number of HIV cases reported to our surveillance system that originate from countries other than Greece. The migratory waves into Greece raise concerns and skepticism, since there is much evidence of an association between human mobility and the distribution of the HIV pandemic.<sup>3–6</sup>

Increasing trends are also observed in European countries such as Italy and Great Britain.<sup>9–12</sup> Most European countries are hosting a considerable number of migrants from a variety of Sub-Saharan countries, and parts of former Soviet Union and its ex-client states in the Eastern Europe.<sup>10</sup> Especially in countries such as France and the UK, the migrants mainly come from their former colonies.<sup>9</sup> Furthermore, migrants in Greece from Western Europe account for a significant share of HIV infections. The percentage of females among HIV-infected migrants in Greece is much higher compared with that of Greek infected females, and overall migrants are reported at a younger age. The modes of transmission among migrants

**Figure 1** Secular trend of HIV-positive immigrants by year of report.

follow a different pattern, with the exposure to HIV through heterosexual contact being more frequent. In contrast, in the Greek population the HIV epidemic is fuelled by MSM.

It was unfeasible in this study to demonstrate whether migrants were infected prior to or after their arrival to Greece, and this may answer the question about the effect of migrants' origin on the epidemic profile of HIV. A recent study in Greece showed that the prevalence of non-B subtypes of HIV is higher in migrants living in Greece (57%) compared with the Greek population, in which subtype B is the most frequent (94%).<sup>13</sup> Many support the concept that conditions of life during the voyage and at the site of destination play a key role. Migration may be an independent risk factor for HIV infection, regardless of destination or origin. In general, HIV transmission in host–migrant interactions depends on the maturity of the HIV epidemic in both the host and the migrant population, the relative seroprevalence of HIV in both populations, the prevalence of other STIs that may facilitate transmission, the level of sexual interaction between the two communities, and the social disruption and stigmatization that characterizes certain types of migration.<sup>14</sup>

Surveillance data have limitations. They do not reflect the incidence of HIV infection and depend heavily on patterns of HIV testing behaviour. The estimated number of people living with HIV/AIDS is higher than that of reported cases, at 9100 (low estimate 4500; high estimate 15 000).<sup>15</sup> The HIV reporting system that was implemented in 1999 may result in reporting delays for cases diagnosed before this year. Despite our efforts to distribute the data retrospectively, errors may exist. This could also partially explain the statistically significant increase in the second period (1999–2002). There were also many cases for which there was no information about nationality or

**Table 3** Logistic regression coefficients and odds ratios of migrants in HIV transmission categories<sup>a</sup>

Transmission category	Coefficient	Odds ratio	<i>P</i> -value	95% CI
Injecting drug users	1.271	3.565	<0.001	2.632–4.829
Haemophiliacs/coagulation disorder	–1.815	0.163	<0.001	0.060–0.441
Transfusion recipients	0.007	1.007	0.984	0.478–2.122
Heterosexuals	1.345	3.838	<0.001	3.243–4.542
Mother to child	1.068	2.910	<0.001	1.443–5.862
Undetermined	1.238	3.450	<0.001	2.953–4.029
Constant	–2.071			

a: Men who have sex with other men is the reference category.

the transmission category, which may also affect the interpretation of the results.

The number of migrants among reported HIV-infected cases in Greece has increased during recent years. Human mobility is an issue that should be included in strategies to control the spread of the virus. Efforts to halt the spread by controlling the movement of infected or potentially infected individuals have proven ineffective and socially reprehensible. Closing borders and mass deportation may not be the option. Additionally, in Greece, the inability of authorities to curb migration is largely a function of Greece's role as a tourist destination. Attempts should be made to shift to consideration of migrants' social conditions that make them vulnerable to HIV and other STIs. Cross-sectional, population-based surveys can provide rapid information on HIV, STIs and sexual behaviour. HIV prevention programs should be implemented and effectively targeted. The HCIDC in Greece employs a considerable number of people who are focused on issues related to immigrants. Nevertheless, more prevention programs and a comprehensive public health approach should be applied.

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### Key points

- Estimation of the specific characteristics of HIV infected migrants reported in Greece.
- Description of the secular trend of migrants' proportion among HIV infected individuals.
- The number of HIV positive migrants reported to our surveillance system has increased during the last years. More prevention programs focused on migrants and a comprehensive public health approach should be applied.

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