

A DEMOGRAPHIC AND HEALTH SURVEY OF SPANISH FEMALE SEX WORKERS: HIV PREVALENCE AND ASSOCIATED RISK FACTORS

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Summary. In order to examine the prevalence of HIV infection and associated risk factors amongst Spanish female prostitutes a multicentre ($n=22$) cross-sectional study was conducted between November 1989 and January 1991. Data collected included socioeconomic characteristics, sexual behaviour and health status together with blood samples. A total of 1633 prostitutes were recruited into the study. Of these, 1433 (87.8%) consented to blood samples being taken and 180 (12.6%) were HIV positive. HIV seroprevalence was 54.7% for intravenous drug users (IVDUs) versus 3.7% for non-IVDUs. Previous imprisonment, hepatitis B and a partner who was an IVDU were significant predictors of HIV infection according to multivariate logistic regression models.

Introduction

In almost all societies prostitutes have traditionally been marginalized by the majority of the population, which has resulted in widespread ignorance of the issues facing this diverse group of people. This situation was further accentuated at the beginning of the acquired immunodeficiency syndrome (AIDS) pandemic when it became evident that prostitutes formed a high-risk group for infection with the human immunodeficiency virus (HIV). Studies showing a high level of infection amongst prostitutes in Africa and elsewhere in the developing world (reviewed in Estébanez, Fitch & Nájera, 1993) gave rise to fears that this group would facilitate the transmission of HIV amongst heterosexuals in the developed world. This belief stigmatized sex workers further and, in some places, led to restrictive legislation such as mandatory HIV testing and the

quarantine of infected persons (Committee on AIDS Research and the Behavioural, Social, and Statistical Sciences, 1990). Indeed the confirmation that HIV can be transmitted through sexual contact seems to have resulted in the rediscovery of prostitution as a problem for society. Prostitutes, however, are a heterogeneous group in regard to their working environment, socioeconomic situation, health status and their knowledge and practice of protective measures (Estébanez *et al.*, 1993). This variability suggests that prostitutes are not necessarily susceptible to HIV infection *per se*, but that its prevalence should depend on different socioeconomic, sexual and behavioural characteristics such as sexual promiscuity (Fischl *et al.*, 1987), use of intravenous drugs (Piot *et al.*, 1987), having a steady partner who is an intravenous drug user (McKeganey *et al.*, 1990) and the presence of sexually transmitted diseases (CDC Collaborative Group for the Study of HIV-1, 1990).

In Spain, the semi-legal status of sex-workers makes it impossible to estimate the number of women working as prostitutes. A report published in the daily newspaper *El País* (on the 7th April 1988) indicated the existence of 300,000 to 400,000 prostitutes in Spain. Within Spain, as with many other societies, prostitution is practised for a variety of reasons, from supplementing family income to financing a drug habit. Coincidental with the spread of AIDS in Spain, at the beginning of the 1980s the authorities became concerned with increasing drug use and the possible association with prostitution. This gave impetus to an extensive debate in the political and social arena about the usefulness of obligatory health and administrative controls of prostitution. Moreover, in the scientific field there was increased interest in the prevalence of sexually transmitted diseases (STDs), including HIV, and in public health.

Given this background, in 1989 we instigated an investigation into the health status of female prostitutes in Spain. The overall objective of the study was to identify how the social status of prostitutes affects their health and to describe risk factors for HIV and other STDs (Estébanez, 1995). More specifically it was hypothesized that prostitutes formed a socially disadvantaged group that was not necessarily homogeneous, but susceptible to a range of STDs (including HIV) contracted through their work. This paper describes the results of this study with regard to HIV prevalence and associated risk factors.

Subjects and methods

Data on 1633 female prostitutes working in 29 provinces in Spain were collected as part of a cross-sectional study conducted by 22 collaborating centres in five 2-month periods: November/December 1989; May/June 1990; November/December 1990; May/June 1991; and November/December 1991. To be eligible for the study a prostitute had to have earned money through sexual relations at least once in the previous year and be willing to disclose this information to the interviewer. Although, due to the confidentiality of the study, it was not possible to dismiss the re-enrolment of prostitutes in different phases, qualitative feedback from the field workers suggested that this only occurred for 20 to 30 women (i.e. 1 to 2%).

As limited information was available on the number of prostitutes in Spain it was not possible to select a representative sample population. Moreover, it was not possible to record how many prostitutes could be potentially recruited from each centre.

Consequently, the sample population was selected through the enrolment of prostitutes from areas known to be used for recruitment of clients. Enrolment occurred through a variety of means determined by the local centres including, for example, adverts and word of mouth. The advantage of this heterogeneous method was that the sample 'snow-balled' in size as enrolled prostitutes introduced other associates to the interviewer. The sample therefore consisted of women who had a consultation at one of the 22 collaborating centres or who had specifically attended the centre in order to participate in the study. It was not possible to record the number of people who refused to participate.

Face-to-face interviews were conducted by trained personnel using a structured questionnaire which had previously been tested during the pilot phase of the study (Estébanez, 1995). Each questionnaire was coded to assure the anonymity and confidentiality of the study participants. Detailed data were collected on sociodemographic information, sexual behaviour and health status. These included information on reproductive and sexual histories and possible known risk factors for HIV infection. Participants were classified into five modes of prostitution according to the type of client recruitment at the time of the study: street prostitution; bars (or clubs) in urban centres; bars (or clubs) on highways away from urban centres; brothels; and call girls (recruitment by phone or in hotels and restaurants). Information collected on sexual habits was based on the month preceding the interview and classified with reference to three types of partner: clients (defined as all people with whom the study participant had had commercial sexual relations); stable partners (defined as all people with whom the study participant cohabited or maintained non-commercial sexual relations for at least three consecutive months); and at-risk partners (defined as a stable partner with a particular risk of transmitting HIV; these included intravenous drug users (IVDUs), bisexuals, people of African or Caribbean origin and people who were HIV positive).

At the end of the interview, study participants who gave their informed consent were asked to provide a blood sample for testing for HIV and other STDs. Laboratory analyses were carried out at the Carlos III Health Institute, Madrid, using indirect RAPID-ELAVA ELISA (Pasteur) and competitive ENVACORE ELISA I (Abbot) for the detection of HIV-1 antibodies (with confirmation by Western blot (Dupont)); for the detection of HIV-2 antibodies, ELISA AVIA-2 (Pasteur), with confirmation by New.LAV.Blot 2 (Dupont); and for the detection of hepatitis B antibodies, ELISA (Abbot).

The statistical package SPSS was used to investigate the prevalence of HIV amongst Spanish prostitutes and to examine the relationship between HIV and various independent variables. Statistically significant associations ($p < 0.01$) between the independent variables and HIV serological status were identified using the chi-squared test. Odds ratios were estimated for those independent variables which demonstrated a statistically significant association ($p < 0.01$). Multivariate logistic regression analyses were used to control for intervening confounding variables.

Results

The sociodemographic characteristics of the study population are summarized for selected variables in Table 1. From a total of 1633 female prostitutes enrolled during the five phases of the study 67% were born in Spain. The mean age of the population

Table 1. Selected sociodemographic characteristics of the study population ($n = 1633$)

Characteristic	Number	Per cent
Country of birth ($n = 1627$)		
Spain	1085	66.7
Other	542	33.3
Age ($n = 1633$)		
14–19	70	4.3
20–24	374	22.9
25–29	476	29.1
30–34	332	20.3
35–39	196	12.0
40–44	97	5.9
45–49	44	2.7
50–54	22	1.4
55+	22	1.4
Educational attainment ($n = 1630$)		
No schooling	101	6.2
Primary incomplete	628	38.5
Primary complete	626	38.5
Secondary	232	14.2
University	43	2.6
Marital status ($n = 1630$)		
Single	870	53.4
Married/partner	270	16.6
Separated/divorced	434	26.6
Widowed	56	3.4
Occupational status ($n = 1307$)		
Prostitution	860	65.8
Waitress	145	11.1
Cleaner	49	3.7
Administrative	14	1.1
Saleswoman	14	1.1
None	148	11.3
Other	77	5.9
Number of children ($n = 1635$)		
0	547	33.9
1	526	32.2
2	263	18.3
3 or more	547	16.1

was 29.8 years (standard deviation, 8.02 years; range, 14–74 years). Educational attainment was low, with 83.2% of the sample completing primary school education or less and only 2.6% having undertaken university courses. Over half (53.4%) of women were single and a quarter (26.6%) were separated or divorced. The majority (65.8%) of the population stated that prostitution was their occupation although a further 17.0%

Table 2. Type of sexual relations by partner and use of condoms

Type of sexual relation	Percentage practising	Percentage who always or nearly always use a condom
Client*		
Vaginal	98.0	72.2
Oral	73.1	27.8
Anal	14.2	33.8
During menstruation	46.6	40.7
Stable partner†		
Vaginal	96.5	13.2
Oral	74.8	3.0
Anal	24.2	3.9
During menstruation	31.4	8.2
At-risk partner‡		
Vaginal	93.2	20.3
Oral	80.8	6.5
Anal	28.4	9.9

*Defined as all people with whom the study participants had had commercial sexual relations.

†Defined as all people with whom the study participant cohabited or maintained non-commercial sexual relationships for at least three consecutive months.

‡Defined as a stable partner with a particular risk of transmitting HIV (ie IVDUs, bisexuals, people of African or Caribbean origin and people who were HIV positive).

of the sample declared their occupation to be bar and restaurant work, cleaning, administration or sales. Finally, two-thirds (66.2%) of women had one or more children.

The mean number of clients per month for each prostitute was 77.21 (standard deviation, 40.46; range, 0–699). The majority (77.8%) of women reported having a stable partner in the past five years and exactly half reported currently having a stable partner. Just under a fifth (18.5%) of stable partners were at-risk partners.

The sexual habits of the women who provided information are summarized in Table 2. For the month preceding the interview 98.0% of women replied that they practised vaginal intercourse with their clients whilst 85.8% stated that they 'never' had anal intercourse with clients. Overall 72.2% of the sample 'always', or 'nearly always', used condoms with their clients during vaginal intercourse: 27.8% during oral sex; 33.8% during anal intercourse; and 40.7% whilst menstruating. In contrast, for stable partners and at-risk partners only 13.2 and 20.3% of women respectively used a condom during vaginal intercourse.

Other possible risk factors associated with HIV infection include the 13.9% of women who had been in gaol (from 1615 replies); 8.4% who had received a blood transfusion (from 1592 replies); 4.1% of women who had been in contact with blood

products or had been exposed to blood (from 1627 replies); and 19.9% of women who had an at-risk partner (from 1497 replies). In addition, from 1556 replies, 191 women (12.3%) reported that they were currently intravenous drug users (IVDUs) and an additional 119 (7.6%) reported that they had been in the past. Of the 1633 participants 1433 (87.8%) permitted serological tests, of whom 180 (12.6%) were HIV positive. Likewise, 41.7% (of 1095 women) were positive for hepatitis B and 30.6% for syphilis. Finally, it should be noted that ethical considerations did not permit a comparison between those who consented to serological tests versus those who did not.

Although a very significant association between province and HIV seroprevalence was observed (for example, in Málaga and Zaragoza over half of the cases analysed were HIV positive, whilst for Barcelona only 3.3% were), it should be emphasized that these differences are likely to have arisen from the different proportions of IVDUs in each sub-sample. Thus, in Barcelona only one IVDU was included in the sample, whilst in Zaragoza all the HIV-positive cases were IVDUs. The remaining risk factors which demonstrated a degree of statistical association ($p < 0.01$) with an HIV-seropositive result are given in Table 3. A negative association was identified for age, where the youngest age group (14–19 years) reported the highest prevalence of HIV (20.3%) and the elder groups (>35 years) the lowest (<10%). Amongst those variables examined, the sexual behaviour and health of the prostitutes, mode of prostitution, years working as a prostitute and evidence of hepatitis B were important bivariate risk factors (Table 3). For example, the highest prevalence of HIV was amongst prostitutes who recruited clients in the street (35.5%) whilst the lowest prevalence was reported for highway bars (6.2%). The relationship between HIV and years working as a prostitute was quadratic, with the highest prevalence (16.9%) reported for women working 6 to 10 years and the lowest for women working less than 1 year (6.1%) and more the 15 years (1.9%). Just over one-fifth (23.3%) of HIV-positive women had had hepatitis B compared to 4.8% of HIV-negative women. Other bivariate risk factors included: living arrangements; ever having been in prison; having a companion who is an IVDU or who is HIV positive; being an IVDU; and the frequency of consumption of alcohol, tobacco and drugs (Table 3).

From the bivariate analysis presented in Table 3 it would seem that sexual behaviour was not an important determinant of HIV prevalence amongst female prostitutes. It is therefore important to be aware of a number of statistically insignificant (i.e. $p \geq 0.05$) observations that have been made from these data (Estébanez, 1995). Firstly, in a bivariate analysis of condom use during vaginal sex with clients, an insignificant negative association with HIV prevalence was reported. That is, HIV prevalence was higher for women who 'always' used a condom when compared to those who 'never' did (20.0 versus 10.1%). Likewise, the association between syphilis and HIV was not statistically significant. Finally, there was an interesting, although non-significant, U-shaped association between HIV prevalence and the number of clients. For women who had relations with fewer than 30 men or 30–100 men in the past month, HIV prevalence was 12.7% ($n=323$) and 10.1% ($n=486$), respectively. The rate increased to 16.1% ($n=174$) for 101–180 men and then declined to 15.2% ($n=46$) and 5.2% ($n=96$) for 181–300 and more than 300 sexual acts in the past month. A similar relationship has been observed in a study of HIV-infected prostitutes in Amsterdam (Fennema *et al.*, 1995) and may be indicative of increased

Table 3. The prevalence of HIV infection in Spanish prostitutes by risk factor*

Risk factor	Denominator	HIV + prevalence	
		<i>n</i>	%
Age			
<i>(n</i> = 1406; χ^2 = 54.73; <i>df</i> = 4)			
14–19	59	12	20.3
20–24	315	56	17.8
25–29	418	74	17.7
30–34	279	30	10.8
35 +	335	1	2.1
Living arrangements			
<i>(n</i> = 1375; χ^2 = 32.14; <i>df</i> = 5)			
Alone	299	40	13.4
With child	210	11	5.2
With partner and child	377	43	11.4
With friends	314	38	12.1
With parents	136	34	25.0
Other	39	8	20.5
Previous imprisonment			
<i>(n</i> = 1396; χ^2 = 113.70; <i>df</i> = 1)			
Yes	192	70	36.5
No	1204	107	8.9
Mode of prostitution			
<i>(n</i> = 1324; χ^2 = 117.78; <i>df</i> = 5)			
Street	211	75	35.5
Highway bar	274	17	6.2
Brothel	325	30	9.2
Urban bar	455	41	9.0
Hotel/pension	41	5	12.2
Other	18	2	11.1
Partner IVDU			
<i>(n</i> = 575; χ^2 = 112.85; <i>df</i> = 1)			
Yes	129	58	45.0
No	446	30	6.7
Partner HIV +			
<i>(n</i> = 613; χ^2 = 57.60; <i>df</i> = 1)			
Yes	57	31	54.4
No	556	78	14.0
Years working as a prostitute			
<i>(n</i> = 1329; χ^2 = 21.87; <i>df</i> = 4)			
< 1 year	114	7	6.1
1–5 years	637	94	14.8
6–10 years	325	55	16.9
11–15 years	148	17	11.5
> 15 years	102	2	2.0

Table 3. Continued

Risk factor	Denominator	HIV + prevalence	
		<i>n</i>	%
IVDU			
<i>(n</i> = 1339; χ^2 = 441.54; <i>df</i> = 1)			
Yes	269	139	51.7
No	1070	36	3.4
Consumption of alcohol			
<i>(n</i> = 1339; χ^2 = 17.22; <i>df</i> = 5)			
Daily	416	42	10.1
Nearly daily	141	18	12.8
2–3 times a week	100	14	14.0
Occasionally	330	42	12.7
In the past	44	14	31.8
Never	308	40	13.0
Consumption of tobacco			
<i>(n</i> = 1367; χ^2 = 22.11; <i>df</i> = 5)			
Daily	1019	150	14.7
Nearly daily	56	7	12.5
2–3 times a week	11	1	9.1
Occasionally	41	2	4.9
In the past	23	5	21.7
Never	217	9	4.1
Consumption of drugs			
<i>(n</i> = 1159; χ^2 = 114.34; <i>df</i> = 5)			
Daily	88	36	40.9
Nearly daily	45	16	35.6
2–3 times a week	27	7	25.9
Occasionally	150	31	20.7
In the past	75	13	17.3
Never	774	54	7.0
Hepatitis B			
<i>(n</i> = 963; χ^2 = 73.04; <i>df</i> = 1)			
Yes	403	94	23.3
No	560	27	4.8

*All risk factors are significantly associated with HIV at $p < 0.01$ using the Pearson χ^2 test. *df*, degrees of freedom.

professionalism with respect to HIV prevention amongst prostitutes with a large number of clients.

In light of the strong bivariate association of HIV with IVDU reported in Table 3, infection in the 36 non-IVDU prostitutes was examined in further detail (Table 4). It should be noted that this analysis is subject to small number problems; however, despite this the rate of HIV amongst non-IVDU prostitutes (3.4%) is one of the highest

Table 4. The prevalence of HIV infection for the 36 non-IVDU prostitutes by risk factor*

Risk factor	Denominator	HIV + prevalence	
		<i>n</i>	%
Country of birth (<i>n</i> = 1067; $\chi^2 = 0.85$; <i>df</i> = 1; <i>p</i> = 0.3578)			
Spain	663	25	3.8
Other	404	11	2.7
Previous imprisonment (<i>n</i> = 1047; $\chi^2 = 0.45$; <i>df</i> = 1; <i>p</i> = 0.3334)			
Yes	85	4	4.7
No	926	32	3.3
Blood transfusion (<i>n</i> = 1039; $\chi^2 = 0.93$; <i>df</i> = 1; <i>p</i> = 0.2314)			
Yes	124	6	4.8
No	915	29	3.2
At-risk partner (<i>n</i> = 338; $\chi^2 = 3.92$; <i>df</i> = 1; <i>p</i> = 0.0478)			
Yes	107	9	8.4
No	281	10	3.6
Hepatitis B (<i>n</i> = 725; $\chi^2 = 4.22$; <i>df</i> = 1; <i>p</i> = 0.0399)			
Yes	265	14	5.3
No	460	11	2.4
Syphilis (<i>n</i> = 740; $\chi^2 = 1.09$; <i>df</i> = 1; <i>p</i> = 0.2962)			
Yes	226	10	4.4
No	514	15	2.9

**p* values calculated using the Fisher exact test for 2 × 2 tables with any expected cell value less than 5 and the Pearson χ^2 test for remaining tables. *df*, degrees of freedom.

reported for comparable populations in the USA and Europe. It is therefore interesting to note that there was a marginally higher rate of HIV infection in the six non-IVDU women who had had a blood transfusion when compared to those who had not (4.8 versus 3.2%). Likewise women who were Spanish, had been in prison and had hepatitis B or syphilis recorded an insignificantly higher rate of HIV infection. On the other hand, women who had an at-risk partner had a significantly higher rate of HIV infection (8.4 versus 3.6%).

All variables that were significantly (*p* < 0.01) associated with HIV in the bivariate analysis (Table 3) were included in the multivariate analysis (Table 5). As IVDU was the most significant bivariate risk factor for HIV infection (Odds Ratio (OR) = 20.71), two separate models were computed for IVDU and non-IVDU. For non-IVDU a strong, statistically significant (*p* < 0.01) association was reported for having a

Table 5. Multivariate logistic regression: HIV infection amongst non-IVDUs ($n=1067$) and IVDUs ($n=261$)

Risk factor	Odds ratios (95% confidence intervals) ^{a,b}			
	Non-IVDUs ^c		IVDUs ^c	
Age ^e	0.92*	(0.98–0.87)	0.94	(1.01–0.89)
Living arrangements				
Alone	0.99	(3.44–0.28)	2.15	(9.98–0.46)
With child	~		~	
With partner and child	1.06	(3.50–0.32)	1.83	(8.68–0.39)
With friends	0.85	(3.05–0.24)	4.80	(23.26–0.99)
With parents	0.26	(2.51–0.03)	2.02	(9.57–0.43)
Other	0.83	(10.12–0.07)	4.56	(40.45–0.51)
Missing	0.00	(0.00–0.00)	0.68	(5.26–0.09)
Previous imprisonment				
Yes	1.09	(4.16–0.29)	1.76	(3.47–0.89)
No	~		~	
Missing	0.00	(0.00–0.00)	1.66	(17.93–0.15)
Mode of prostitution				
Street	1.72	(11.30–0.26)	2.74*	(7.41–1.02)
Highway bar	~		~	
Brothel	2.05	(7.73–0.54)	2.68	(8.11–0.88)
Urban bar	4.56	(17.14–1.21)	1.91	(5.96–0.61)
Hotel/pension	1.33	(18.75–0.09)	1.33	(8.56–0.21)
Other	3.96	(22.06–0.71)	1.13	(4.50–0.29)
Partner IVDU				
Yes	7.72**	(28.09–2.12)	2.14	(5.29–0.87)
No	~		~	
Missing	0.34	(11.89–0.01)	0.73	(5.68–0.09)
Partner HIV +				
Yes	8.91	(143.89–0.55)	7.92**	(39.22–1.60)
No	~		~	
Missing	3.06	(111.48–0.08)	2.67	(21.66–0.33)
Years working as a prostitute ^d	1.00	(1.01–0.98)	1.00	(1.02–0.98)
Consumption of alcohol				
Daily	0.63	(1.78–0.22)	0.91	(2.43–0.34)
Nearly daily	0.57	(2.42–0.13)	1.24	(4.17–0.37)
2–3 times a week	0.49	(2.65–0.09)	1.57	(5.91–0.42)
Occasionally	0.40	(1.26–0.13)	1.62	(4.10–0.64)
In the past	0.73	(9.66–0.05)	1.87	(7.38–0.47)
Never	~		~	
Missing	0.99	(8.89–0.11)	2.73	(19.70–0.38)
Consumption of tobacco				
Daily	0.59	(1.63–0.21)	0.00	(0.00–0.00)
Nearly daily	0.63	(6.13–0.07)	0.00	(0.00–0.00)
2–3 times a week	1.32	(19.32–0.09)	—	

Table 5. Continued

Risk factor	Odds ratios (95% confidence intervals) ^{a,b}			
	Non-IVDUs ^c		IVDUs ^c	
Occasionally	1.34	(7.99–0.22)	0.00	(0.00–0.00)
In the past	7.26*	(51.18–1.03)	0.00	(0.00–0.00)
Never	~		~	
Missing	0.64	(7.51–0.05)	0.00	(0.00–0.00)
Consumption of drugs				
Daily	3.47	(18.58–0.65)	1.22	(3.35–0.44)
Nearly daily	0.00	(0.00–0.00)	0.60	(1.89–0.19)
2–3 times a week	1.89	(21.15–0.17)	0.60	(3.04–0.12)
Occasionally	1.77	(5.50–0.57)	0.50	(1.30–0.19)
In the past	0.32	(3.51–0.03)	0.30*	(0.98–0.09)
Never	~		~	
Missing	1.35	(4.08–0.45)	0.39	(1.18–0.13)
Hepatitis B				
Positive	3.19*	(7.91–1.29)	4.18**	(9.83–1.77)
Negative	~		~	
Missing	1.40	(3.62–0.54)	3.47**	(8.33–1.45)

^aDummy variables indicated by ‘~’. No data indicated by ‘—’.

^bOdds ratios and confidence intervals rounded to two decimal places.

^c–2 log likelihood = 263.92; model $\chi^2 = 51.07$; df = 39; $p = 0.0933$.

^d–2 log likelihood = 292.14; model $\chi^2 = 80.47$; df = 38; $p = 0.0001$.

^eAge and years working as a prostitute are continuous variables.

* $p < 0.05$; ** $p < 0.01$.

partner who was an IVDU (OR = 7.72). Other significant variables included: age, working in an urban bar, consuming tobacco in the past, and a positive hepatitis B result. For the IVDU model an HIV-positive partner (OR = 7.92), positive hepatitis B test (OR = 4.18) and a missing hepatitis B test (OR = 3.47) were strongly ($p < 0.01$) associated with HIV (Table 5). Finally, although not illustrated, the parsimonious model for non-IVDUs included only three variables (age, IVDU partner and hepatitis B) and for IVDUs four variables (age, living arrangements, HIV-positive partner and hepatitis B).

Discussion

This study has demonstrated the importance of drug use in contributing to HIV infection in women. Moreover, it has illustrated that drug use and heterosexual transmission – via an at-risk, stable partner – are the major causes of HIV in prostitutes. However, the marginalized characteristics of the study population and the sensitive information collected may result in biased data. In highlighting this problem

we do not wish to undermine the importance of these findings, but to illustrate the obstacles faced by researchers in undertaking studies such as this. The first potential error may be the selection of a non-representative sample population. As information on the denominator was unavailable it was not possible to examine this issue. Furthermore, it was deemed unethical to collect information on those women who refused to be interviewed. Nevertheless, due to the multicentre design of the study, and the fact that similar results were obtained for each period of data collection, we can tentatively conclude that there was no systematic variation within the data. Another potential error may have been information bias, where respondents have deliberately misreported information due to its sensitive nature. As it would be very difficult to detect this type of error, it is important to be aware of this possibility in discussion. Thirdly, the nature of cross-sectional studies can in itself produce apparently spurious results. For example, the non-significant, negative association between condom use and HIV infection is probably indicative of a change in behaviour following infection and does not imply that condom use is a risk factor. Finally, it should be stressed that the study only investigated *female* sex workers, and although the findings may have implications for male prostitutes this cannot be assumed.

The sociodemographic characteristics of the current sample of female prostitutes are atypical of the Spanish population and are comparable with communities of low socioeconomic status. For example, the low levels of educational attainment reported in Table 1 are very different from average figures for the whole of Spain (Estébanez, 1995). In addition, the proportionately large immigrant population in the sample most likely reflects low socioeconomic status and does not necessarily imply a direct association between immigration and prostitution. The socioeconomic status of the prostitutes may best be characterized by the high levels of intravenous and other drug use (Table 3). The current study observed that one-fifth of the sample population injected drugs. This is in agreement with other studies conducted in Spain which reported that between 12 and 18% of prostitutes were IVDUs (Santamaría, 1988; Palacio *et al.*, 1989), thereby confirming the relatively high rate of IVDU in Spain compared to the rest of Europe. It is not possible, however, to provide conclusive evidence of whether drug use is the cause or effect of prostitution. For example, the perceived fact that heroine use begins at a young age coincides with the age of the current sample, and may be evidence of a causal effect. On the other hand, the high numbers of female drug addicts working as prostitutes (e.g. > 50% in Glasgow; Roberston & Plant, 1988) may provide evidence of the reverse relationship. It should also be noted that drug addiction has a wider influence on the lifestyle of all prostitutes (not only those who are users). For example, as many prostitutes have partners who are IVDUs they are exposed to similar health and social risks including, for instance, proximity to drug trafficking. Indeed this may be one of the reasons for the relatively high levels of past imprisonment (13.9%) amongst the women interviewed. In other words, these data suggest that prostitutes occupy a low socioeconomic stratum within society, which will complicate the analysis of HIV prevalence and its associated risk factors.

Out of the 1433 prostitutes who permitted HIV tests 12.6% were positive with a 51.7% infection rate amongst IVDUs (Table 3). This result is similar to (although higher than) other observations in Spain and Europe. For example, in Andalusia HIV prevalence was reported to be 2.3% amongst non-IVDUs (Pineda *et al.*, 1992), whilst

in Catalonia 37.0% of IVDU prostitutes were HIV positive (Casabona *et al.*, 1990). In an examination of four Italian cities 36.0% of prostitutes who were IVDUs were HIV positive compared to 2.0% who were non-IVDUs (Tirelli *et al.*, 1987); in Paris 40.0% of IVDUs were HIV positive compared to 1.0% of non-IVDUs (De Vincenzi, 1989); and in Greece, amongst a sample of non-IVDUs, the prevalence of HIV was 6.0% (Papavangelou *et al.*, 1988). In the United Kingdom, however, a study failed to identify a connection between prostitution and IVDU, with a 12.9% HIV prevalence amongst female drug injectors involved with prostitution and 14.4% HIV prevalence among drug injectors not involved in prostitution (Rhodes *et al.*, 1994). Moreover, in a multicentre European study (which included, in part, these current data) Spanish prostitutes reported the highest levels of HIV infections (European Working Group on HIV Infection in Female Prostitutes, 1993). In the United States the prevalence of HIV infection amongst prostitutes has been measured as 23.0% from a sample of 607 women who had been convicted of prostitution in Miami, Florida (Onorato *et al.*, 1995).

After IVDU, the most important (bivariate) determinant of HIV prevalence was the mode of prostitution. In the multivariate analysis this variable was a significant risk factor for non-IVDUs (for prostitutes working in an urban bar) and IVDUs (for prostitutes working from the street). These two observations demonstrate that the low socioeconomic status of the population is an important risk factor of HIV infection. However, in so much as one of the objectives of the current investigation was the identification of factors associated with sexual behaviour, it is interesting to note that having an at-risk partner (be it an IVDU or HIV-positive partner) was the most significant risk factor for both logistic regressions. This may be the result of lower condom use with at-risk and stable partners (Table 2). For example, in a study of 280 female prostitutes recruited in London, UK, it was observed that higher levels of condom use were reported for commercial sex, rather than non-paying partners (Ward *et al.*, 1993). Accordingly, HIV infection was associated with non-paying partners, even when other variables were statistically controlled.

From the current investigation there is extensive evidence that prostitutes live in a peripheral environment. However, due to the nature of observational studies, such data fail to measure various psycho-social factors which may be influencing the welfare and health of the study population. For example, the persistent fear of violence, superficial relationships with clients and the competitive nature of the work provide a classic setting for psychological illness including depression and attempted suicide. In turn, such psychological factors may foster risk-taking behaviour such as IVDU and non-condom use. Furthermore, the combined effects of the socioeconomic and psychological environment are likely to make prostitutes more susceptible to a gamut of illness, which in turn (and especially in the case of other STDs) may facilitate HIV infection. Given the complexity of disentangling the causal risk factors of HIV infection amongst prostitutes, and despite the limitations with this and other similar studies, a number of public health recommendations can be made. Firstly, we would recommend the setting up of programmes to assist drug addicts, especially those that would prevent the spread of disease, such as the use of methadone to prevent the sharing of needles. Secondly, we would suggest an accessible, voluntary screening programme for prostitutes, partners and clients for the detection of HIV, with appropriate counselling. Thirdly, we would recommend the promotion of condom use in the prevention of HIV

and other STDs among prostitutes, their clients and partners. Finally, we would recommend the integration of programmes for the prevention of AIDS and STDs in health programmes, with a preventive and interdisciplinary orientation. In implementing these recommendations it should be recognized that the socioeconomic deprivation which is characteristic of prostitutes and prostitution is in itself a risk factor to adverse health status including HIV infection. More specifically any policy directed at reducing HIV infection must address social discrimination and socioeconomic inequality and incorporate both clients and partners.

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