

# Sexual risk-taking in the general population of Sweden (1989–2007)

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**Abstract.** *Background:* The aim of the study was to assess changes in sexual attitudes and sexual behaviour related to HIV/sexually transmissible infections (STI) during a long period of intensive efforts by the Swedish authorities to curb the spread of HIV. *Methods:* We conducted mailed questionnaire surveys in random samples of the Swedish general population in 1989, 1994, 1997, 2000, 2003 and 2007 (total  $n = 16773$ ). Each sample consisted of some 4000–6000 participants aged 16–44 years, stratified by age: 16–17, 18–19, 20–24, 25–34 and 35–44 years. The overall participation rate was 61.6% (for men, 53.5%; for women, 69.9%). *Results:* Between 1989 and 1994, the proportion of participants holding a restrictive view on sexual intercourse outside a stable relationship decreased significantly. The surveys since 1994 do not show any change in that respect. The prevalence of several sexual partners increased significantly throughout the period of study. The prevalence of casual sexual intercourse without the use of a condom also increased significantly from 1989 until 2003, but decreased slightly between 2003 and 2007. This change in sexual behaviour was more prominent in women than among men. The prevalence of several sexual partners and casual sexual intercourse without the use of a condom was significantly higher for the younger than for the older age cohorts. *Conclusions:* The study demonstrates the need for a continuous preventive campaign against HIV/STI in the general population in Sweden, particularly among young people.

**Additional keywords:** casual sexual contacts, multiple sexual partnerships, sexual attitudes, sexually transmissible infections.

## Introduction

At the end of 2007, the adult prevalence (15–49 years) of HIV in Sweden was 0.05%.<sup>1</sup> This is a low figure in an international comparative perspective, and even on comparison with most countries in Western Europe.<sup>2</sup> The annual tally of newly detected HIV cases in Sweden remained fairly constant from the late 1980s until 2002 but has increased since 2003.<sup>3</sup> Between January 2006 and October 2007, 752 new cases of HIV (466 men and 286 women) were reported to the Swedish Institute for Infectious Disease Control.<sup>4</sup> Fifty-five percent of the HIV cases detected between 2002 and 2007 were reported to have become infected by heterosexual intercourse, 23% by sexual intercourse between men and 8% by intravenous drug abuse. The age range of the newly detected HIV cases in Sweden is commonly 25–39 years. About half of the HIV cases detected in Sweden between 2002 and 2007 were refugees or immigrants who had been infected before their arrival in Sweden.<sup>5</sup> Most of them were reportedly infected by heterosexual intercourse. Since the end of the 1990s, 20–30 individuals, or ~8% of all the newly detected HIV cases in Sweden, were stated to have been infected by heterosexual intercourse while living in Sweden, but this number has increased slightly since 2006.<sup>3</sup>

Chlamydia is the most prevalent sexually transmissible infection (STI) in Sweden. In the early 1990s, there was a decrease in the annual tally of newly detected chlamydia

cases, but between 1997 and 2005, this figure more than doubled (from 14 899 to 34 955 cases).<sup>1</sup> The incidence of chlamydia increased rapidly even during 2006 and 2007. Fifty-nine percent of the cases detected in 2007 were women. The average age in new cases was slightly over 20 years. Since the mid-1990s, the incidence of chlamydia has increased particularly for women aged 15–19 years and men aged 20–24.

Preventive measures against HIV and STI in Sweden are conducted and largely financed by the Swedish public agencies; county councils, youth clinics, medical centres, schools and various voluntary and immigrant organisations are all involved in this work. During the late 1980s, several nationwide information campaigns were undertaken to curb the spread of HIV.<sup>5</sup> Since the 1980s, the frequency and targeting of HIV/AIDS preventive campaigns have both been modified. Preventive work is now directed towards several identified groups: men who have sex with men, injecting drug users, immigrants from high prevalence countries, adolescents and young adults, people who frequently travel abroad, pregnant women, prostitutes and people who are HIV carriers.<sup>2</sup>

In recent years, several trends indicating high-risk sexual behaviour have been observed in Sweden. Apart from the increase in the incidence of chlamydia, there has been an increase in the number of abortions among young women,<sup>6</sup> while the use of condoms has remained relatively low.<sup>7</sup> These

trends have necessitated measures to intensify the work to check the spread of HIV. A new national HIV policy was adopted in 2005 and improved forms for collaboration and increased coordination are being sought. Since 2006, the National Board for Health and Welfare has a mandate for the planning of this work.

Heterosexual intercourse is the most common mode of transmission in most countries in the world.<sup>2</sup> Therefore, to improve the basis for preventive work, several investigations into sexual behaviour in the general population have been made in recent years. Such studies have been carried out in countries with a high prevalence of HIV<sup>2</sup> but also in countries with a lower prevalence.<sup>8–13</sup> Most of them investigate the situation on a single occasion, while a few have been designed to analyse changes over time. Consequently, these studies lack information concerning the effects of public campaigning to engender safer sexual behaviour.

In this study, a series of six cross-sectional studies on sexual behaviour in the general population were undertaken between 1989 and 2007 in Sweden. We can thus analyse developments over a long period of extensive efforts by the Swedish authorities to curb the spread of HIV and other STI. It is pertinent to ask whether risky sexual activity related to HIV would diminish and whether attitudes to casual sexual intercourse would become more restrictive during the course of the epidemic.

## Methods

### *Participants*

Questionnaires were mailed to a random sample of the general population in 1989, 1994, 1997, 2000, 2003 and 2007. The samples were selected from the SPAR register (Swedish abbreviation for State address register of the entire Swedish population), which is an up-to-date register including all persons in the Swedish national registry, regardless of whether they are Swedish citizens or not. The surveys in 1989, 1994, 1997 and 2003 were based on random samples of 4000 individuals (age range 16–44 years). The population in each sample was divided into five age strata: 16–17, 18–19, 20–24, 25–34 and 35–44 years. Eight hundred individuals were randomly selected from each stratum. The surveys in 2000 and 2007 were based on random samples of 6000 individuals. The age stratification was the same in these surveys as in the surveys in 1989, 1994, 1997 and 2003, and 1200 individuals were randomly selected from each stratum.

The age stratification was aimed at comparing adolescents and newly adult individuals *v.* adults in later stages of life. We wanted especially to elucidate knowledge and attitudes among adolescents at different ages (16–17 years and 18–19 years).

### *Measures*

The individuals in the six surveys were mailed a questionnaire concerning knowledge of, attitudes to, and beliefs and practices (KABP) associated with HIV/AIDS and STIs. In each survey, identically worded questions were asked regarding the

demographic characteristics of the participants: gender, age, relationship status (married/cohabiting, single with a regular partner, or single without a regular partner), educational standard (compulsory schooling, upper secondary schooling, and university education) and residence (rural, small-to-medium town, or urban area). The period of compulsory schooling in Sweden is 9 years and for upper secondary education, a further 3 years.

In all six surveys, the following questions were asked about the participants' sexual behaviour: 'With how many persons have you had sexual intercourse during the past 12 months?' and 'Have you had sexual intercourse with somebody on a first date without the use of a condom during the past 12 months?' For the first question, the participants were asked to answer precisely. The second question was in 'multiple choice' format with the following response options: 'Yes, once,' 'Yes, more than once,' and 'No.' The expression 'sexual intercourse on a first date' refers (in a Swedish context) to a situation where two persons have sexual intercourse the first time they meet (for example at a party, festival or after a restaurant visit).

Concerning sexual attitudes, the participants were asked to agree or disagree with the statement 'Sexual intercourse should only take place in a stable relationship' (response options: 'Agree' or 'Don't agree'). The expression 'stable relationship' is frequently used in Sweden and refers to a long-term sexual relationship. No further definition of this expression was given in the questionnaire.

To identify persons whose a sexual behaviour implied increased risk *vis-à-vis* HIV and STI (according to Swedish norms), we used three or more sexual partners during the preceding 12 months as the main dependent variable concerning number of sex partners.

### *Procedure*

Each person who was randomly selected for inclusion in the study was sent an information pack including a covering letter explaining the purpose of the study and an 85–90-item questionnaire with detailed instructions on how to complete and return it. In the covering letter, it was explained that in order to establish a basis for preventive measures against HIV, the purpose of the study was to obtain information about the KABP associated with this infection in the general population. Information regarding how the answers were to be used was also given. Reminders (three at most) were sent to respondents who had not replied.

In each survey, 70–130 individuals from the original sample were excluded as they had moved from the country, were unreachable by letter or were deceased. The overall participation rate related to the net sample was 61.6% (Table 1); the rates for men and women were 53.5% and 69.9%, respectively. Questions about sexual behaviour were disregarded by 1–2% of the participants. The participation rate was higher in the 1989 survey than subsequent surveys, and was the lowest in the 2007 survey. Altogether, 16773 persons participated in the study: 7354 men and 9419 women. Table 2 shows numbers of participants by demographic characteristics.

### Statistical analyses

Multiple logistic regression analyses were performed, using stepwise (retrograde) input of dichotomous variables and with odds ratios adjusted for all other sociodemographic variables and for year of survey.<sup>14</sup> Odds ratios were calculated separately for men and women. The percentages given are weighted proportions with regard to the size of the population in each age stratum.

**Table 1. Participation rated by sex, age band, and year of survey (in %)**

	Year of survey						Overall
	1989	1994	1997	2000	2003	2007	
Men (years)							
16–17	55.0	52.0	56.3	45.8	60.0	39.1	51.2
18–19	57.9	58.5	56.6	47.0	52.0	36.8	51.3
20–24	60.0	58.9	60.8	53.1	58.5	46.1	55.9
25–34	65.0	56.9	57.1	56.1	54.2	44.6	55.6
35–44	67.3	53.1	53.0	50.6	58.9	43.5	54.5
Men (combined)	61.2	55.9	56.7	50.4	56.8	41.9	53.5
Women (years)							
16–17	74.9	66.6	71.2	58.0	70.1	52.3	65.1
18–19	75.9	77.4	79.9	72.8	69.8	61.1	72.6
20–24	84.1	79.4	70.4	73.2	73.8	64.6	74.0
25–34	77.0	68.1	70.4	67.4	71.4	63.8	69.4
35–44	77.4	65.6	67.7	69.1	73.3	64.1	69.4
Women (combined)	77.8	71.3	71.9	68.0	71.7	61.2	69.9
Men + women (combined)	69.4	63.4	64.2	59.3	64.1	51.3	61.6

**Table 2. Numbers of participants by sex, age band, relationship status, educational standard, residence and year of survey**

	Number of participants		
	Men	Women	Combined
Age (years)			
16–17	1405	1736	3141
18–19	1405	1931	3336
20–24	1536	1975	3511
25–34	1507	1898	3405
35–44	1501	1879	3380
Relationship status			
Married/cohabiting	2560	3959	6519
Single with a regular partner	1319	2033	3352
Single without a regular partner	3323	3160	6483
Educational standard			
Compulsory schooling	1314	1533	2847
Upper secondary schooling	4511	5562	10 073
University education	1397	2127	3524
Residence			
Rural	1715	2107	3822
Small-to-medium town	3293	4070	7363
Urban	2296	3103	5399
Year of survey			
1989	1223	1504	2727
1994	1112	1362	2474
1997	1138	1389	2527
2000	1494	2028	3522
2003	1124	1388	2512
2007	1263	1748	3011
Overall	7354	9419	16 773

### Results

#### Partner distribution

Table 3 shows the distribution of all the participants in the six surveys by number of sexual partners. Ten percent of the respondents reported no sexual partner during the preceding 12 months. This proportion was much higher in the younger age groups than in the 25–34 and 35–44-year cohorts, particularly for men. However, greater proportions of the adolescents and young adults reported several sexual partners during the preceding 12 months than did the 25–44-year-olds.

In the 1989–2003 surveys, questions were not asked about same-sex contacts, whereas in the 2007 survey, we asked about the sex of the current/latest sexual partner. Only 1.8% of the men and 1.2% of the women reported a same-sex relationship. An exposition of knowledge based HIV prevention in Sweden, directed towards men who have sex with men, is given by Tikkanen.<sup>15</sup>

#### Sexual attitudes

Of the participants in the 1989–2007 surveys, 41.1% of men and 48.3% of women agreed with the statement ‘Sexual intercourse should only take place in a stable relationship’ (Table 4). Multiple logistic regression showed that the odds ratio for women to concur was 1.4 (1.3–1.5) (reference group: men).

Those who were less likely to hold this opinion were men and women in the younger age groups (reference group: 35–44-year-olds), single persons without a regular partner (reference group: married or cohabiting persons), persons with an upper secondary schooling or university education (reference group: persons with compulsory schooling only), persons living in small-to-medium towns or urban areas (reference group: persons living in rural areas) and persons with more than one sexual partner (reference group: persons

**Table 3. Distribution of the participants by sex, age band and number of sex partners in the preceding 12 months (%)**

	None	One	Two	Three	Four	Five+	Total
Age (years)							
Men							
16–17	55	27	11	4	2	1	100
18–19	34	38	13	8	4	3	100
20–24	14	55	14	8	5	4	100
25–34	8	78	6	4	2	2	100
35–44	6	85	5	2	1	1	100
Men (combined)	12	72	8	4	2	2	100
Women							
16–17	41	36	12	7	2	2	100
18–19	19	51	15	8	4	3	100
20–24	8	65	14	7	4	2	100
25–34	5	85	6	3	1	0	100
35–44	6	87	4	2	1	0	100
Women (combined)	9	78	7	3	2	1	100
Men + women (combined)	10	76	7	4	2	1	100

**Table 4. Proportions (%) of the participants and odds ratios (OR) for agreeing with the statement 'Sexual intercourse should only take place in a stable relationship'**

	%	Men OR (95% CI)	<i>P</i>	%	Women OR (95% CI)	<i>P</i>
Sex	41.1	1.0		48.3	1.4 (1.3–1.5)	<0.001
Age (years)						
16–17	39.4	0.7 (0.6–0.9)	0.017	52.2	0.7 (0.6–0.9)	0.003
18–19	39.0	n.s.	n.s.	46.5	0.7 (0.5–0.8)	<0.001
20–24	34.9	0.8 (0.6–1.0)	0.014	43.7	0.7 (0.6–0.8)	<0.001
25–34	39.8	n.s.	n.s.	44.3	0.7 (0.6–0.9)	<0.001
35–44	45.9	1.0		54.0	1.0	
Relationship status						
Married/cohabiting	44.6	1.0		50.3	1.0	
Single with a regular partner	38.8	n.s.	n.s.	48.2	n.s.	n.s.
Single without a regular partner	35.8	0.7 (0.5–0.8)	<0.001	42.6	0.8 (0.6–0.9)	0.001
Educational standard						
Compulsory schooling	53.9	1.0		64.0	1.0	
Upper secondary schooling	41.7	0.7 (0.6–0.9)	<0.001	49.4	0.8 (0.7–0.9)	0.003
University education	31.8	0.5 (0.4–0.6)	<0.001	39.6	0.6 (0.5–0.7)	<0.001
Residence						
Rural	49.4	1.0		56.3	1.0	
Small-to-medium town	41.4	0.8 (0.7–1.0)	0.015	48.8	0.8 (0.7–1.0)	0.007
Urban	32.6	0.7 (0.6–0.8)	<0.001	39.7	0.7 (0.6–0.8)	<0.001
Number of sex partners						
None	49.0	1.0		58.7	1.0	
One	43.1	0.6 (0.5–0.7)	<0.001	49.7	0.6 (0.5–0.7)	<0.001
Two	34.8	0.5 (0.4–0.6)	<0.001	35.1	0.4 (0.3–0.5)	<0.001
Three or more	34.8	0.3 (0.2–0.4)	<0.001	35.1	0.3 (0.2–0.4)	<0.001
Year of survey						
1989	53.1	1.0		65.4	1.0	
1994	41.4	0.6 (0.5–0.7)	<0.001	44.4	0.4 (0.3–0.5)	<0.001
1997	42.8	0.5 (0.4–0.6)	<0.001	52.4	0.5 (0.4–0.6)	<0.001
2000	35.4	0.5 (0.4–0.6)	<0.001	38.8	0.3 (0.3–0.4)	<0.001
2003	37.3	0.5 (0.4–0.6)	<0.001	42.8	0.4 (0.3–0.5)	<0.001
2007	36.0	0.5 (0.4–0.6)	<0.001	45.4	0.4 (0.3–0.5)	<0.001

**Table 5. Proportions (%) of the participants distributed by sex, age band and year of survey agreeing with the statement 'Sexual intercourse should only take place in a stable relationship'**

	1989	1997	2007	Chi-square	<i>P</i>
Men (Age, years)					
16–24	51	32	31	80.0	<0.001
25–34	45	39	30	13.1	0.001
35–44	53	50	38	14.3	<0.001
Women (Age, years)					
16–24	64	42	38	15.8	<0.001
25–34	55	48	40	14.5	<0.001
35–44	65	57	46	25.0	<0.001
Overall					
16–24	57	37	35	23.5	<0.001
25–34	50	43	35	25.9	<0.001
35–44	59	53	42	35.1	<0.001

with no sexual partner during the preceding 12 months) (Table 4).

As evident from Table 4, the likelihood of holding a restrictive view on sexual intercourse outside a stable relationship was significantly lower in the 1994–2007 surveys than in the 1989 survey. This trend was evident for both men

and women, but particularly for women. The proportion of men who considered that sexual intercourse should only take place in a stable relationship declined from 53.1% in 1989 to 36.0% in 2007. The corresponding proportions for women were 65.4% and 45.4%. Compared with 1989, the odds ratios for men and women in 2007 were 0.5 (0.4–0.6) and 0.4 (0.3–0.5).

Table 5 shows the proportions of the participants, distributed by sex age band and year of survey (1989, 1997 and 2007 surveys), agreeing with the statement 'Sexual intercourse should only take place in a stable relationship'. The three youngest age cohorts were combined into one age band (16–24 years) in the table. The proportions given are weighted percentages. Chi-square tests indicated that all the differences with respect to year of survey are statistically significant.

The age cohorts 25–34 years in 1994 and 35–44 years in 2007 were at approximately the same age as the cohort 16–24 years in 1989. The proportions of the participants in these cohorts agreeing with the statement 'Sexual intercourse should only take place in a stable relationship' differed significantly (Table 5; chi-square tests, not shown in the table: *P*/men <0.001, *P*/women <0.001, *P*/overall <0.001). Thus, the study indicates that attitudes to the

**Table 6.** Proportions (%) of the participants and odds ratios (OR) for three or more sex partners

	%	Men OR (95% CI)	<i>P</i>	%	Women OR (95% CI)	<i>P</i>
Sex	10.9	1.0		7.2	0.8 (0.8–1.0)	0.005
Age (years)						
16–17	16.3	n.s.	n.s.	16.6	2.5 (1.7–3.6)	<0.001
18–19	24.3	1.7 (1.2–2.5)	0.001	20.7	3.5 (2.5–5.0)	<0.001
20–24	22.9	2.2 (1.6–23.1)	<0.001	15.7	3.8 (2.7–5.3)	<0.001
25–34	10.6	1.9 (1.4–22.7)	<0.001	5.4	1.9 (1.3–2.8)	0.001
35–44	4.3	1.0		2.6	1.0	
Relationship status						
Married/cohabiting	1.2	1.0		1.1	1.0	
Single with a regular partner	18.5	11.6 (8.0–216.7)	<0.001	12.9	4.9 (3.7–6.5)	<0.001
Single without a regular partner	31.3	24.8 (17.5–35.2)	<0.001	25.3	12.7 (9.8–16.5)	<0.001
Educational standard						
Compulsory schooling	9.6	1.0		6.9	1.0	
Upper secondary schooling	12.1	n.s.	n.s.	8.1	n.s.	n.s.
University education	9.5	n.s.	n.s.	6.0	n.s.	n.s.
Residence						
Rural	5.9	1.0		3.9	1.0	
Small-to-medium town	11.8	1.9 (1.5–22.4)	<0.001	7.6	1.3 (1.0–1.6)	0.042
Urban	14.7	2.3 (1.8–23.0)	<0.001	9.8	1.6 (1.3–2.0)	0.001
Year of survey						
1989	9.0	1.0		5.3	1.0	
1994	9.2	n.s.	n.s.	6.5	1.5 (1.1–2.0)	0.010
1997	9.5	1.3 (1.0–21.8)	n.s.	6.4	1.4 (1.1–1.9)	0.018
2000	14.3	1.5 (1.1–22.0)	0.007	7.1	1.6 (1.2–2.1)	0.002
2003	10.2	1.8 (1.3–2.5)	<0.001	8.4	1.9 (1.4–26)	<0.001
2007	13.4	1.9 (1.5–2.6)	<0.001	9.9	2.7 (2.0–3.5)	<0.001

acceptability of sexual intercourse outside a stable relationship among teenagers or young adults in 1989 became successively more liberal as persons at these ages grew older.

#### *Multiple sexual partnerships*

Of the sexually active male participants, 10.9% reported three or more sexual partners during the preceding 12 months (Table 6). The corresponding proportion for women was 7.2%. Compared with men, the odds ratio for three or more sexual partners for women was 0.8 (0.8–1.0).

For both men and women, the odds ratios for three or more sexual partners during the preceding 12 months were significantly higher for age cohorts 18–19, 20–24 and 25–34 years compared with the 35–44-year cohort (reference group) (Table 6). The differences were greater for women than for men. There was a significant difference between the female 16–17-year cohort and the 35–44-year cohort. For both sexes, the odds ratios for several sexual partners were significantly higher for single persons than for married or cohabiting persons, and for persons living in small-to-medium towns and urban areas, compared with persons living in rural areas. These differences were greater for men than for women. There were no significant differences with respect to participants' educational standard, whether men or women.

The odds ratios for several sexual partners were significantly higher in the 1997–2007 surveys than in the 1989 survey (Table 6). For women, there was also a significant difference between the 1994 and the 1989 survey. The differences in the prevalence of several sexual partners between the 1989 survey

and the 1994–2007 surveys were generally greater for women than for men. There was an increase in the prevalence of several sexual partners throughout the period of study, but the increase was most noticeable during the latter half of the period.

#### *Casual sexual contacts*

Of the sexually active male and female participants, 11.2% and 7.4%, respectively, reported unprotected casual sex (UCS; sexual intercourse on a first date without the use of a condom) during the preceding 12 months (Table 7). Compared with men (reference group), the odds ratio for UCS for women was 0.9 (0.8–1.0).

According to age, the differences in the prevalence of UCS were similar to those in the prevalence of several sex partners (Table 7). Particularly for women, there were significant differences between the 35–44-year cohort and the younger age cohorts. Even concerning residence and relationship status, similar differences appeared as for the prevalence of several sex partners; i.e. single persons and persons living in small-to-medium towns and urban areas were significantly more likely to have UCS, than married or cohabiting persons or persons living in rural areas. Concerning educational standard, women with a university education were significantly less likely to have UCS than women with only compulsory schooling.

As regards to the year of survey, the prevalence of UCS was significantly greater in the 1994–2007 surveys than in the 1989 survey, except for men in the 1994 survey (Table 7). There was a continuous increase in the prevalence of UCS until 2003, but



**Table 7. Proportions (%) of the participants and odds ratios (OR) for casual sexual intercourse without the use of a condom**

	%	Men OR (95% CI)	P	%	Women OR (95% CI)	P
Sex	11.2	1.0		7.4	0.9 (0.8–1.0)	0.019
Age (years)						
16–17	15.2	n.s.	n.s.	16.5	2.4 (1.7–3.3)	<0.001
18–19	21.5	1.7 (1.2–2.3)	0.002	18.9	3.0 (2.1–4.1)	<0.001
20–24	22.0	2.4 (1.8–3.2)	<0.001	15.4	3.7 (2.7–5.1)	<0.001
25–34	11.3	2.1 (1.5–2.9)	<0.001	5.5	1.8 (1.3–2.6)	<0.001
35–44	4.6	1.0		2.9	1.0	
Relationship status						
Married/cohabiting	1.9	1.0		1.6	1.0	
Single with a regular partner	18.8	8.0 (5.8–11.1)	<0.001	11.7	3.4 (2.6–4.4)	<0.001
Single without a regular partner	26.7	14.7 (10.9–19.9)	<0.001	23.0	8.3 (6.5–10.5)	<0.001
Educational standard						
Compulsory schooling	10.2	1.0		7.4	1.0	
Upper secondary schooling	12.3	n.s.	n.s.	8.9	n.s.	n.s.
University education	9.8	n.s.	n.s.	5.0	0.6 (0.4–0.8)	<0.001
Residence						
Rural	7.4	1.0		4.4	1.0	
Small-to-medium town	11.8	1.3 (1.1–1.6)	0.009	8.2	1.3 (1.0–1.6)	0.016
Urban	13.6	1.7 (1.3–2.1)	<0.001	8.6	1.4 (1.1–1.8)	0.003
Year of survey						
1989	9.3	1.0		5.0	1.0	
1994	8.8	n.s.	n.s.	5.2	1.5 (1.1–2.1)	0.009
1997	9.9	1.4 (1.1–1.9)	0.010	7.5	2.3 (1.7–3.0)	<0.001
2000	13.5	1.5 (1.1–1.9)	0.005	6.8	1.9 (1.4–2.5)	<0.001
2003	14.0	1.9 (1.5–2.5)	<0.001	10.0	2.7 (2.1–3.7)	<0.001
2007	11.9	1.3 (1.0–1.7)	0.030	9.7	2.5 (1.9–3.2)	<0.001

between 2003 and 2007, there was a slight decrease. However, there was still a significant difference between the beginning and the end of the period of study. The change over time was considerably greater for women than for men.

## Discussion

The present study revealed a significant increase in the prevalence of multiple sexual partners and also of casual sexual acquaintances without the use of a condom since the onset of the AIDS epidemic in Sweden. The study thus shows that despite the risk of contracting a deadly virus, the general public have not adopted safer sexual practices. The study also demonstrates a shift towards a more permissive attitude to sexual contacts outside of stable relationships, but this change occurred exclusively during the first 5 years of the period of study.

The data for the present study were gathered by using postal surveys. As the AIDS issue was a topic of intense debate in Sweden when the study started, we expected a high respondent motivation and a good participation rate by using this method. The overall participation rate was 61.6%, which was better than in other studies of this kind.<sup>11,16</sup> Many studies on sexual behaviour based on face-to-face interviewing have given higher participation rates,<sup>13,17</sup> although others have produced similar or even lower rates than the present study.<sup>9,12,18</sup> Studies based on telephone interviewing are advantageous in so far as the bias towards highly educated responders is reduced and they allow comparative privacy.

Several studies with this design have also given fairly high response rates.<sup>19–21</sup>

It became evident in other studies that participants in national sexuality surveys had a higher socioeconomic status, were better educated, were more sexually experienced and had less conservative sexual attitudes than non-participants.<sup>22,23</sup> The distribution of the non-responders in the present study with respect to these variables is not known. It is therefore possible that differences in these characteristics between responders and non-responders could compromise the results although, according to Dunne *et al.* such bias is probably not particularly serious.<sup>24</sup>

People with stigmatised or risky behaviours could have been expected to decline to participate in the study and under-report risky behaviour due to a suspicion that the survey information could be misused. This bias may be important, but we believe that it was not particularly great in this study. A model for society has emerged in Sweden, including a strong public sector satisfying people's basic needs and encouraging a reasonable degree of trust between people ('the Swedish model').<sup>25</sup> Even if opinions according to this model have weakened in recent years, presumably as a result of both a continuous change in attitudes among young Swedes and extensive immigration, they probably still influence the assessment of Swedish people concerning the risk that sensitive survey information might be misused.

It is possible that the participants who responded late were less willing to respond than those who responded early. This might have meant that the KABP of the late responders differed from that of the early responders, approaching the KABP of those who did not respond at all. We therefore examined, in the

2003 and 2007 surveys, if there were any significant differences between the responses of the late and the early responders; no such differences were found. It is therefore conceivable, on the basis of these analyses, that the KABP of the non-responders was fairly similar to that of the responders.

Two major studies on sexual behaviour in the general population of Sweden indicated that the average number of sexual partners increased significantly between 1967 and 1996.<sup>17,18</sup> This long-term trend is consistent with the finding of the present study. Other studies have indicated that the trend was halted during the 1980s, perhaps as a result of the preventive campaign against HIV/AIDS which was launched in the middle of that decade.<sup>26,27</sup> However, considering the significant increase in number of sexual partners and in casual sexual intercourse during 1989–2007 as established in the present study, it seems that this change was only temporary.

The present study shows that sexual risk taking increased significantly more for women than for men during the period of study, a finding consistent with the results of the British sex study.<sup>9,12</sup> The major Swedish sex studies in 1967 and 1996 showed the same long-term trend.<sup>17,18</sup> Some theorists suggest that as equality develops between the sexes, sexual behaviour between the sexes also converges.<sup>28</sup> Although sexual equality is constantly under scrutiny in Sweden, equality is not ubiquitous, and a gap between the sexes still exists with regard to sexual activity, although diminishing.

The attitude to sexual contacts outside a stable relationship was found to have changed significantly between 1989 and 1994, but not in the subsequent surveys. However, the study showed a continuous change in the prevalence of several sexual partners and casual sexual contacts, throughout the study period. The study thus shows that the period of change in sexual behaviour was subsequent to the period of change in sexual attitude.

Our findings can be interpreted having regard to the fact that young people in Sweden marry and settle down later today than earlier, which means that the period of 'bachelor life' has lengthened.<sup>29</sup> In Sweden, about one person in three (35%) who married in 2001 was below 30 years of age (only 28% in 2007). Between 1970 and 2007, the average age for women when they gave birth to their first child increased from 24.0 to 28.6 years.

Another factor that might explain increasing sexual risk activity is the extended use of the internet during the 21st century. Extensive communication concerning sex matters now takes place over the internet. Nearly all of those aged 16–24 years use the internet. The internet as a communication medium has created new forms of contact in which it is possible to seek sexual partners, based on other preconditions than those prevailing in the past.<sup>30</sup>

Many Swedish studies since the 1960s have shown that most Swedes believe that sexual intercourse should only take place within the scope or confines of a love affair.<sup>27</sup> However, the present study shows that the proportion of participants who agreed with the statement that sexual intercourse should only take place in a stable relationship has decreased significantly. Obviously, the previously strict attitude in the population that sex should take place only in a love affair has weakened substantially in recent years. This

change can be seen in the light of the fact that sexuality has become more and more released from the connection with pregnancy which has made it easier for people to form their sexuality independently.

An important issue is the connection between change in sexual attitudes and sexual behaviour. In view of the increasing tolerance towards casual sexual intercourse, particularly for women, one could expect more candid responses concerning sexual risk-taking. Behavioural change could thus have been overestimated in this study. This bias has been pointed out in a study by Copas *et al.* showing that participants in a survey undertaken in 2000 reported unfaithfulness in marriage and cohabitation to a significantly higher extent than participants of the same age in a survey in 1990.<sup>31</sup> The study by Copas *et al.* also shows that the participants in the 2000 survey reported significantly more sensitive sexual behaviour before 1990 than the participants of the same age in the 1990 survey. A greater outspokenness may also have led to greater willingness to participate in the survey by those with sensitive sexual experience.

Nevertheless, the marked change in reported attitudes concerning sexual intercourse outside a stable relationship provides evidence of the population's behavioural change. Furthermore, data showing that the incidence of chlamydia has risen steeply in the population of Sweden since the mid-1990s, particularly among women aged 15–29 years<sup>1</sup> support the conclusion that sexual risk-taking has increased during the course of the study.

As the study revealed an increase in sexual risk behaviour and a more permissive attitude to sex outside a stable relationship, particularly in the younger age groups, one could expect that there would be an increase in the incidence of HIV in these groups, but this is not the case. Proportionately, most inhabitants of Sweden who have been infected by heterosexual intercourse are 30–34 years old.<sup>3</sup> However, the long-term risk that the incidence of HIV will increase in the younger age groups cannot be ignored.

Two-thirds of all STI worldwide occur in teenagers and young adults.<sup>32</sup> Risky sexual behaviour is often an expression of non-sexual need and associated with fundamental problems and difficulties.<sup>33,34</sup> According to one report on public health in Sweden, the mental health of children and teenagers has worsened in recent years.<sup>35</sup> This fact may be a cause of the higher incidence of sexual risk-taking in the younger age groups. However, further research is warranted in order to explain this trend and to find methods of preventive work to combat such risks.

There is convincing evidence that condoms provide fairly reliable protection against those STI that are transmitted mainly via infected secretions, which include HIV and chlamydia.<sup>36</sup> Consequently, a substantial part of the preventive measures in Sweden (and many other countries) have aimed at encouraging the use of condoms in risky sexual contacts. There is some evidence that these efforts have been successful in the younger age groups. The proportion of sexually active Swedish youths aged 16–17 years who reported that they had used a condom during the preceding month increased from 52% in 1989 to 67% in 2007.<sup>37</sup> This trend is consistent with the findings from a British study showing that condom use in the past year among

sexually active 16–24-year-old males increased from 61.0% in 1990 to 82.1% in 2000.<sup>38</sup>

However, the present study found widespread sexual risk behaviour in the general population in Sweden and that the odds ratio for casual sexual intercourse without the use of a condom even increased significantly in the general population overall from 1989 to 2007, particularly among women, although there was a slight decrease between 2003 and 2007. Previous research has identified numerous obstacles to increased use of condoms in risky sexual contacts.<sup>39,40</sup> Obviously, despite many years of widespread condom promotion, these obstacles have not yet been removed and it seems that consistent condom use is difficult to maintain.

Some researchers have maintained that another preventive measure that would have even greater effect, if it were more widely and assertively promoted, is partner reduction.<sup>41</sup> However, many studies have shown that intervention programs aiming at making young people defer sexual relationships until they are older or get married are ineffective.<sup>42,43</sup> Such programs may postpone sexual debut among young people to some extent, but there is no evidence that continence will prevail until marriage, and the program will not reduce the frequency of teenage pregnancies. A UNICEF report pointed out that the effectiveness of sex prevention tactics varies according to the cultural norms of the society where they are employed.<sup>44</sup> According to UNAIDS, a broad strategy using a combination of different methods is essential to combat the spread of HIV and STI.<sup>45</sup> Promotion of condom use in risky sexual intercourse is an indispensable element in such a strategy.

When shaping a strategy for the prevention of HIV and STI, particularly among young people, different social and cultural aspects which are decisive for forming their view of sexuality and their way to behave in different sexual situations must be taken into consideration. In a review by Marston and King, based on 268 qualitative reports, several such aspects have been identified.<sup>40</sup> Furthermore, intervention programs must be based on the fact that young people are a heterogeneous section of society, for example regarding age, sex, cultural background and sexual experience. Each of these aspects requires a special intervention program.<sup>46</sup>

An important qualification to the present study was the differing response rates observed between age and sex stratum as well as by study year. The reliability of the results was probably affected as the non-responders may not have had the same attitudes and sexual behaviour as the respondents. Second, retrospective reporting, particularly of sexual behaviour, can result in over- or under-reporting, depending on several factors. Bearing these limitations in mind, the study has nevertheless enabled us to delineate changes in sexual attitudes and behaviour from the onset of the AIDS epidemic in Sweden until 2007.

### Conflict of interests

None declared.

### Acknowledgements

This study was funded by the Swedish Medical Research Council, the Swedish National Institute of Public Health, and the Swedish National Board

for Health and Welfare. The author is grateful to Margareta Forsberg for very helpful comments on the manuscript and to Jan Ifver for valuable statistical assistance.

### References

- 1 Swedish Institute for Infectious Disease Control. Epidemiologisk årsrapport 2007 [Annual Epidemiological Report 2007]. Stockholm: Swedish Institute for Infectious Disease Control; 2008.
- 2 United Nations General Assembly. Special session on HIV/AIDS. Country Progress Report 2008: Sweden. New York: United Nations General Assembly; 2008.
- 3 Swedish Institute for Infectious Disease Control. Statistik för hivinfektion 2007 [Statistics for HIV infection 2007]. Stockholm: Swedish Institute for Infectious Disease Control; 2008.
- 4 UNAIDS. 2008 report on the global AIDS epidemic. Geneva: UNAIDS; 2008.
- 5 Herlitz C, Steel J. A decade of HIV/AIDS prevention in Sweden: changes in attitudes associated with HIV and sexual risk behaviour from 1987 to 1997. *AIDS* 2000; 14: 881–90. doi: 10.1097/00002030-200005050-00015
- 6 Swedish National Board for Health and Welfare. Aborter 2007 [Induced abortions 2007]. Stockholm: Swedish National Board for Health and Welfare; 2008.
- 7 Herlitz C. Allmänheten och HIV/AIDS: Kunskaper, attityder och beteenden 1987–2003 [HIV/AIDS and society: knowledge, attitudes and behaviour 1987–2003]. Stockholm: Swedish National Institute for Public Health (Report R 2004: 7); 2004.
- 8 Visser RO, Smith AMA, Rissel CE, Richters J, Grulich AE. Sex in Australia: heterosexual experience and recent heterosexual encounters among a representative sample of adults. *Aust N Z J Public Health* 2003; 27: 146–54. doi: 10.1111/j.1467-842X.2003.tb00802.x
- 9 Johnson A, Mercer C, Erens B, Copas AJ, McManus S, Wellings K, et al. Sexual behaviour in Britain: partnerships, practices, and behaviours. *Lancet* 2001; 358: 1835–42. doi: 10.1016/S0140-6736(01)06883-0
- 10 Leridon H, von Zessen G, Hubert M. The Europeans and their sexual partners. In: Huber M, Bajas N, Sandfort T, eds. Sexual behaviour and HIV/AIDS in Europe. London: UCI Press; 1998.
- 11 Matthews M, Wellings K, Kupek E. AIDS/HIV: knowledge, attitude and behaviour surveys in the European community (general population). London: London School of Hygiene and Tropical Medicine; 1997.
- 12 Wellings K, Field J, Johnson AM, Wadsworth J. Sexual behaviour in Britain: the national survey of sexual attitudes and lifestyles. London: Penguin Books; 1994.
- 13 Laumann E, Gagnon JH, Michael RT, Michaels S. The social organisation of sexuality: sexual practices in the United States. Chicago: University of Chicago Press; 1994.
- 14 Rothman KJ. Modern epidemiology. Boston: Little, Brown and Company; 1986.
- 15 Tikkanen R. Kunskapsbaserad HIV-prevention riktad till män som har sex med män i Sverige. En sammanställning och diskussion utifrån internationella kunskapsöversikter [Knowledge based HIV prevention directed towards men who have sex with men in Sweden. An exposition and discussion based on international surveys]. Stockholm: Swedish National Board for Health and Welfare; 2007.
- 16 Catania JA, Gibson DR, Chitwood DD, Coates TJ. Methodological problems in AIDS behavioral research: influences on measurement error and participation bias in studies of sexual behavior. *Psychol Bull* 1990; 108: 339–62. doi: 10.1037/0033-2909.108.3.339
- 17 Zetterberg H. Om sexuallivet i Sverige [On sexual life in Sweden]. Stockholm: National Public Reports (SOU); 1969.



- 18 Lewin B, Fugl-Meyer K, Helmius G, Lalos A, Månsson S-A. Sex i Sverige. Om sexuallivet i Sverige 1996 [Sex in Sweden, 1996]. Stockholm: Swedish National Institute for Public Health; 1998.
- 19 ASCF Investigators. AIDS and sexual behaviour in France. *Nature* 1992; 360: 407–9. doi: 10.1038/360407a0
- 20 Smith AMA, Rissel CE, Richters J, Grulich AE, de Visser RO. The rationale and methods of the Australian study of health and relationships. *Aust N Z J Public Health* 2003; 27: 106–17. doi: 10.1111/j.1467-842X.2003.tb00797.x
- 21 Davis PB, Yee RL, Chetwynd J, McMillan N. The New Zealand partner relations survey: methodological results of a national telephone survey. *AIDS* 1993; 7: 1509–16.
- 22 Bogaert AF. Volunteer bias in human sexuality research: evidence of both sexuality and personality differences in males. *Arch Sex Behav* 1996; 25: 125–40. doi: 10.1007/BF02437932
- 23 Purdie DM, Dunne MP, Boyle FM, Cook MD, Najman JM. Health and demographic characteristics of participants in an Australian national sexuality survey. Comparison with population norms. *J Epidemiol Community Health* 2002; 56: 748–53. doi: 10.1136/jech.56.10.748
- 24 Dunne MP, Martin NG, Bailey JM, Heath AC, Bucholz KK, Madden PA, *et al.* Participation bias in a sexuality survey: psychological and behavioural characteristics of responders and non-responders. *Int J Epidemiol* 1997; 26: 844–54. doi: 10.1093/ije/26.4.844
- 25 Johansson AL. Tillväxt och klassamhälle; en studie av den svenska modellens uppkomst [Growth and class society: a study on the emergence of the Swedish model]. Doctor's Thesis. Linköping: Linköping University, Sweden; 1988.
- 26 Magnusson C. Adolescent girls' sexual attitudes and opposite-sex relations in 1970 and 1996. *J Adolesc Health* 2001; 28: 242–52. doi: 10.1016/S1054-139X(00)00160-9
- 27 Forsberg M. Ungdomar och sexualitet. En forskningsöversikt år 2005 [Young people and sexuality. A research survey in 2005]. Stockholm: Swedish National Institute for Public Health; (Report R 2006: 18); 2006.
- 28 Weinberg MS, Lottes IL, Aveline D. AIDS risk reduction strategies among United States and Swedish heterosexual university students. *Arch Sex Behav* 1998; 27: 385–401. doi: 10.1023/A:1018788126402
- 29 Statistics Sweden. Statistical data base: the population of Sweden. Stockholm: SCB; 2008.
- 30 Månsson S-A, Daneback K, Tikkanen R, Löfgren-Mårtensson L. Kärlek och sex på internet [Love and sex on the internet]. Malmö: Göteborgs Universitet and Malmö Högskola; (Report R 2003: 1); 2003).
- 31 Copas AJ, Wellings K, Erens B, Mercer CH, McManus S, Fenton KA, *et al.* The accuracy of reported sensitive sexual behaviour in Britain: exploring the extent of change 1990–2000. *Sex Transm Infect* 2002; 78: 26–30. doi: 10.1136/sti.78.1.26
- 32 Dehne KL, Riedner G. Sexually transmitted infections among adolescents: the need for adequate health services. *Reprod Health Matters* 2001; 9: 170–83. doi: 10.1016/S0968-8080(01)90021-7
- 33 Genuis SJ, Genuis SK. Managing the sexually transmitted disease pandemic: a time for re-evaluation. *Am J Obstet Gynecol* 2004; 191: 1103–12. doi: 10.1016/j.ajog.2004.03.019
- 34 Cohen MW. Adolescent sexual activity as an expression of nonsexual needs. *Pediatr Ann* 1995; 24: 324–9.
- 35 Swedish National Board for Health and Welfare. Folkhälsosrapport 2005 [Public Health Report 2005] Stockholm: Swedish National Board for Health and Welfare; 2008.
- 36 Mindel A, Sawleshwarkar S. Condoms for sexually transmissible infection prevention: politics versus science. *Sex Health* 2008; 5: 1–8. doi: 10.1071/SH07054
- 37 Herlitz C. HIV och AIDS i Sverige. Kunskaper, attityder och beteenden hos allmänheten 1987–2007 [HIV and AIDS in Sweden: knowledge, attitudes and behaviour, 1987–2007]. Stockholm: National Swedish Board of Health and Welfare; 2008.
- 38 Cassell JA, Mercer CH, Imrie J, Copas AJ, Johnson AM. Who uses condoms with whom? Evidence from national probability sample surveys. *Sex Transm Infect* 2006; 82: 467–73. doi: 10.1136/sti.2005.019117
- 39 Hamerslag A. Kondomen som skydd mot sexuellt överförbara sjukdomar [The condom as a protection against sexually transmitted diseases]. Falun: Dalarna Research Institute; 1993.
- 40 Marston C, King E. Factors that shape young people's sexual behaviour: a systematic review. *Lancet* 2006; 368: 1581–6. doi: 10.1016/S0140-6736(06)69662-1
- 41 Potts M, Halperin DT, Kirby D, Swidler A, Marseille E, Klausner JD, *et al.* Reassessing HIV prevention. *Science* 2008; 320: 749–50. doi: 10.1126/science.1153843
- 42 Oakley A, Fullerton D, Holland J, Arnold S, France-Dawson M, Kelley P, *et al.* Sexual health education interventions for young people: a methodological review. *BMJ* 1995; 310: 158–62.
- 43 NHS. Effective health Care. Preventing and reducing the adverse effects of unintended teenage pregnancies, Vol. 3, number 1. New York: NHS Centre for Reviews and Dissemination, University of New York; 1997.
- 44 UNICEF. A league table of teenage births in rich nations (Innocenti Report Card No. 3). Florence: UNICEF Innocenti Research Centre; 2001.
- 45 UNAIDS. UNAIDS response to 'Reassessing HIV Prevention'. Geneva: UNAIDS; 2008.
- 46 Forsberg M. Ungdomars sexuella hälsa. Internationella kunskapssammanställningar och svenska erfarenheter av förebyggande arbete [Sexual health of young people. International reviews and Swedish experiences of preventive work]. Stockholm: Swedish National Board for Health and Welfare; 2007.

Manuscript received 16 December 2008, accepted 17 September 2009