

## Factors associated with condom use in women from an urban area in southern Brazil

Fatores associados ao uso do preservativo entre mulheres de uma área urbana no Sul do Brasil

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### Abstract

*This study investigated the prevalence of factors associated with condom use during last sexual intercourse in 15-49-year-old women in a probabilistic sample from the urban area of Pelotas, southern Brazil. A questionnaire administered by an interviewer, investigating socioeconomic characteristics and habits, and another (self-administered) questionnaire on sexual behavior-related variables were used. Poisson regression, following a hierarchical model, was used for data analysis. 1,543 women were included, and losses and refusals amounted to 3.5%. Prevalence of condom use in last sexual intercourse was 28.0%. Condom use was positively associated with younger age, greater schooling, non-white color, single marital status, and greater number of sex partners in the previous three months. This suggests that the group most vulnerable to STDs/AIDS due to lack of condom use is white, adult women, in stable unions, with fewer sexual partners.*

*Acquired Immunodeficiency Syndrome; Sexually Transmitted Diseases; Sexual Behavior; Women's Health; Risk Factors*

### Introduction

In December 2001, there were 40 million people infected with HIV worldwide, of whom 18.5 million were women. Due to the increase in the number of cases classified as heterosexual transmission, HIV infection in women has been increasing. In 2001, almost half of the four million people infected were women. In Latin America, roughly 1.5 million people are infected, and 28.0% of the adults in this group are women <sup>1</sup>. According to Ministry of Health data, more than 500,000 Brazilians are infected with HIV. Between January 1980 and December 2002, more than 250,000 cases were reported country-wide, with 28.0% of this total in women. In 2001, the male-to-female AIDS ratio was 1.7 to 1 <sup>2</sup>.

Women are more vulnerable to STDs, due to both biological and socio-cultural characteristics. Women have certain physical particularities that increase risk of infection: the vaginal surface exposed to semen is large; semen has a greater concentration of HIV than vaginal secretion; STDs are more frequently asymptomatic; and the vaginal mucous membrane is fragile, especially among younger women <sup>3</sup>. Women's social role also increases vulnerability, due to unequal power relationships and economical dependence, which limit access to adequate information and hinder the adoption and maintenance of safe behaviors, especially in developing countries <sup>3</sup>.

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Condom use is one of the most important weapons in the war against AIDS. Laboratory and epidemiological studies have demonstrated that condom use is effective against a number of sexually transmitted diseases, such as gonorrhea, non-gonococcal urethritis, trichomoniasis, and genital herpes, as well as against HIV infection <sup>4</sup>.

The identification of usage patterns among women from the general population can foster the development of programs for promotion of condom use. The present study aims to identify socioeconomic and demographic factors, as well as personal habits, associated with reported condom use among women aged 15-49 years living in a medium-sized city in southern Brazil.

## Methods

The target population in the present study included all 15-49-year-old women residing in the urban area of the city of Pelotas, southern Brazil. A cross-sectional design was employed, with a two-stage probabilistic sampling process: random selection of census tracts and within these sectors, random selection of households. From October 1999 to January 2000, a systematic sample of 48 of the 281 urban census tracts was visited. In each tract a starting point was randomly selected and interviewers searched the neighborhood visiting one out of every three houses until 44 households were included. A total of 2,112 households were selected. All women ages 15-49 years in each household were interviewed. Interviewers were all female, with a high school education, previously trained to administer the questionnaire.

A sample of roughly 1,500 women was required to study the association between an exposure affecting 10% of women and an outcome with 30% prevalence, relative risk  $\geq 1.6$ , 5% alpha, 95% power, and 1.4 design effect.

The questionnaire had three parts: a household module, including family socioeconomic information; an individual module, with questions related to socioeconomic and behavioral variables, both administered by the interviewer; and a confidential, self-administered, numbered questionnaire on the subject's sexual history and practices. The latter, following completion, was placed by the subject in a sealed envelope, which was opened and coded only by the study coordinator.

Data on the following variables were collected: age (in full years, based on date of birth); color (observed by the interviewer, classified as white or non-white); marital status (married/

with partner, single, widow or separated/divorced); family and subject's income in the last month (collected in *reais* and transformed into times the prevailing minimum wages); per capita income (ratio between family income and number of family members); schooling (in completed school years); religious practice (yes/no); current smoking (yes/no); and physical exercise in the previous three months (yes/no), defined as exercise or sports practiced outside school/work hours.

Variables related to risk behaviors were collected by means of the self-administered questionnaire: age at first sexual intercourse (vaginal, oral, or anal, risk being defined as age < 18 years) <sup>5</sup>; condom use during last sexual intercourse (yes/no); alcohol use before last sexual intercourse by subject (yes/no) or partner (yes/no); drug use before last sexual intercourse by subject (yes/no) or partner (yes/no); anal intercourse in last sex encounter (yes/no); number of sex partners in the last three months (risk being defined as two or more reported partners); and perceived risk of acquiring STDs/AIDS (very possible, possible, little possibility, nearly impossible, and impossible). Reported condom use during last sexual intercourse was the outcome in subsequent analyses.

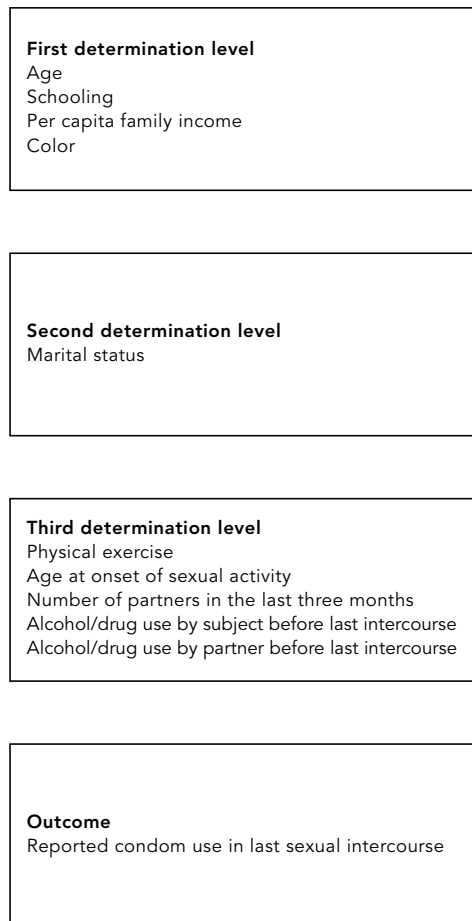
Five percent of interviews were repeated for quality control purposes. Data in all questionnaires were entered twice by different professionals, using Epi Info software v. 6.0, which allowed for the comparison between databases and the correction of entry mistakes. Data cleaning included consistency and amplitude verifications for all variables. The initial analysis was carried out using SPSS software v. 8.0, by establishing frequency distributions. Ignored values for the independent variables were recoded for modal category of grouping variables. The variable with greatest percentage of ignored values was age at first sexual intercourse, with 5.2%.

Stata 8.0 software was employed for analysis through Poisson regression with robust variance. This type of analysis was chosen since the outcome prevalence was greater than 10%, which can lead to overestimation of odds ratios, measure obtained using logistic regression <sup>6</sup>.

In multivariate analysis, variables were introduced according to their causality levels in a hierarchical model (Figure 1). The first level included the variables age, schooling, per capita family income, and color; the second level comprised marital status; and the third level included physical exercise, age at onset of sexual activity; number of sex partners in the last three months; and drug/alcohol use by subject or partner before last sexual intercourse. Vari-

Figure 1

Logistic regression analysis model.



Note: Hierarchical model based on assumed causality determination for condom use in women.

ables were selected for the theoretical framework based on a literature review for factors shown to be related to condom use and other protective behaviors. For each level, a backward elimination linear regression equation was carried out, discarding all variables with  $p > 0.20$ . Variables that remained in the first level were included in the second level equation, once again eliminating variables with  $p > 0.20$ . This procedure was repeated for the third level. The  $p > 0.20$  threshold was adopted because confounders may affect estimates even when their significance levels do not reach the 0.05 level<sup>7</sup>. An analysis including all described variables (including those with  $p > 0.20$ ) was also carried out; results were similar to those ob-

tained in the hierarchical model and will not be described.

For purposes of presenting results, only variables with  $p < 0.05$  were considered significant. More details on the present methodology may be found in other publications originated from the same data<sup>8,9</sup>.

All participating subjects provided verbal informed consent to participate in the study. The study protocol was approved by the Institutional Review Board/ Research Ethics Committee of the Federal University in Pelotas.

## Results

We visited 2,112 households, listed all residents, and recorded their sex and age. In the case of empty or closed houses, this information was obtained from neighbors. We identified 1,851 women between 15 and 49 years of age, of whom 65 (3.5%) refused or were not able to participate in the interviews after at least three attempts. Of the remaining 1,786, a total of 1,543 women who reported being sexually active were included. The subsequent analyses are based on the latter group.

Prevalence of the target outcome, reported condom use during last sexual intercourse, was 28.0%.

Age distribution was homogeneous, with a lower frequency of adolescents (9.7%), since many of the latter were still not sexually active. Roughly four-fifths of subjects were white; 61.0% were married or in stable unions, followed by 27.3% of singles; one-fifth of the subjects belonged to families with per capita income  $\leq 0.5$  the minimum wage; 41.0% declared having no personal income; more than half had up to 8 years schooling; and 55.0% did not practice religion. As to behavioral variables, 30.0% of women reported being smokers; and 72.0% had no regular physical exercise.

Concerning STD/AIDS risk behaviors: onset of sexual activity took place before age 18 in 47.0% of the sample; 14.0% of partners used alcohol and/or drugs before last sexual intercourse; 7.0% had two or more sex partners in the previous three months; and 3.0% practiced anal intercourse during their last sex encounter.

Table 1 presents crude and adjusted prevalence ratios for socioeconomic and demographic variables, included in the first hierarchical level. Variables age and schooling remained associated with condom use during last sexual intercourse after adjustment. Women in the 15-19-year age group were 2.3 times more likely to report condom use during last sexual inter-

Table 1

Prevalence rates for condom use in women, according to socio-demographic variables.  
Pelotas, Rio Grande do Sul, Brazil, 1999/2000.

Variable	%*	% condom use during last intercourse	Crude	Adjusted
<b>Age in years**</b>				
15-19	9.70	47.0	2.30 (1.70-3.11)	2.31(1.70-3.14)
20-24	15.60	34.3	1.68 (1.24-2.28)	1.61(1.19-2.19))
25-29	13.90	25.0	1.23 (0.87-1.72)	1.19(0.85-1.67)
30-34	13.70	30.0	1.47 (1.06-2.03)	1.40(1.01-1.94)
35-39	15.40	24.3	1.19 (0.85-1.66)	1.14(0.82-1.60)
40-44	15.60	22.6	1.11 (0.78-1.57)	1.05(0.74-1.49)
45-49	16.10	20.4	1.00	1.00
	n = 1,543		(p < 0.001)	(p < 0.001)
<b>Schooling (years)**</b>				
≤ 4	18.20	21.2	1.00	1.00
5-8	37.20	28.3	1.34 (1.03-1.74)	1.23 (0.94-1.60)
9-11	26.40	29.0	1.37 (1.04-1.81)	1.21 (0.92-1.59)
≥ 12	18.20	32.1	1.52 (1.14-2.02)	1.51 (1.13-2.01)
	n = 1,537		(p = 0.06)	(p = 0.02)
<b>Per capita income (in times minimum wage)***</b>				
≤ 0.5	18.70	27.8	1.00	1.00
0.51-1.00	23.00	24.9	0.89 (0.69-1.16)	0.88 (0.67-1.15)
1.01-2.00	26.20	26.9	0.97 (0.75-1.24)	0.94 (0.73-1.22)
> 2	32.10	31.5	1.13 (0.90-1.43)	1.03 (0.78-1.37)
	n = 1,510		(p = 0.14)	(p = 0.63)
<b>Skin color#</b>				
White	78.80	27.3	1.00	1.00
Non-white	21.20	31.1	1.14 (0.94-1.37)	1.27 (1.05-1.55)
	n = 1,543		(p = 0.17)	(p = 0.02)
<b>Marital status##</b>				
Single	60.80	51.7	3.14 (2.65-3.74)	3.15(2.57-3.87)
Separated/divorced	27.30	34.9	2.12 (1.63-2.76)	2.16(1.65-2.83)
Widow	9.70	24.2	1.48 (0.79-2.74)	1.63(0.88-3.03)
Married/with partner	2.20	16.4	1.00	1.00
	n = 1,543		(p < 0.001)	(p < 0.001)

\* Totals do not coincide due to missing information for some variables.

\*\* Adjusted model including variables age and schooling.

\*\*\* Adjusted model including variables age, schooling, per capita income, and color.

# Adjusted model including variables age, schooling, and color.

## Adjusted model including variables age, schooling, color, and marital status.

course than those in the 45-49-year group. Among women with more schooling (12+ years), the prevalence ratio was 50% higher than in the 0-4-year schooling group.

Non-white women reported higher levels of condom use, a difference which remained significant after adjustments for age and schooling. Per capita income remained non-significant after adjustment for the remaining variables, this being excluded from the model. The variable woman's personal income was not included in multivariate analysis due to its > 0.20 significance level in the bivariate analysis.

Marital status (included in the model's second level) remained significant after adjust-

ment. Single women were three times more likely to report condom use than those married or with stable partners. Religious practice was not included in multivariate analysis.

In the third level (Table 2), physical exercise lost significance after adjustment and was eliminated from the model. Smoking, risk perception of acquiring STDs/AIDS, and anal intercourse were not included in the multivariate analysis ( $p > 0.20$ ).

In bivariate analysis, age at onset of sexual activity  $\leq 17$  years was associated with greater reported condom use, but this association lost significance after adjustments for age, schooling, color, alcohol/drug use by subject before

Table 2

Prevalence rates for condom use in women, according to behavioral variables. Pelotas, Rio Grande do Sul, Brazil, 1999/2000.

Variable	%*	% condom use during last intercourse	Crude	Adjusted
<b>Physical exercise**</b>				
No	71.60	26.4	1.00	1.00
Yes	28.40	32.2	1.22 (1.03-1.45)	1.14 (0.96-1.36)
	n = 1,538		(p = 0.02)	(p = 0.23)
<b>Age at onset of sexual activity in years**</b>				
$\geq 18$	52.90	25.9	1.00	1.00
$\leq 17$	47.10	30.5	1.8(1.01-1.39)	0.95 (0.78-1.15)
	n = 1,462		(p = 0.04)	(p = 0.54)
<b>Alcohol/drug use by subject before last sexual intercourse**</b>				
No	93.10	26.7	1.00	1.00
Yes	6.90	45.7	1.71 (1.36-2.14)	1.24 (0.98-1.56)
	n = 1,532		(p < 0.001)	(p = 0.16)
<b>Number of partners during last three months***</b>				
$\leq 1$	93.10	26.1	1.00	1.00
$\geq 2$	6.90	50.5	1.93 (1.56-2.40)	1.43 (1.14-1.79)
	n = 1,468		(p < 0.001)	(p = 0.001)
<b>Alcohol/drug use by partner before last sexual intercourse**</b>				
No	86.50	27.1	1.00	1.00
Yes	13.50	34.0	1.26 (1.02-1.55)	0.88 (0.67-1.17)
	n = 1,508		(p = 0.03)	(p = 0.41)

\* Totals do not coincide due to missing information for some variables.

\*\* Adjusted model including variables age, schooling, color, marital status, physical exercise, age at onset of sexual intercourse, alcohol/drug use by subject, number of partners during last three months, and alcohol/drug use by partner.

\*\*\* Adjusted model including variables age, schooling, color, marital status, alcohol/drug use by subject, and number of partners during last three months.

last sexual intercourse, and number of sex partners in the previous three months, and the variable was excluded from the model. The same occurred with alcohol/drug use by partner before last sexual intercourse.

The association between alcohol/drug use by subject before last sexual intercourse and condom use during last sexual intercourse was rendered non-significant after adjustment ( $p = 0.16$ ) and was kept in the model for confounder control only. Number of partners in the previous three months remained significantly associated with the outcome ( $p = 0.001$ ). Women who reported two or more partners in the three months prior to the interview had a 40% greater probability of condom use in last sexual intercourse.

## Discussion

Since this is a population-based study, it was possible to describe the distribution of reported condom use during last sexual intercourse in a medium-sized city in southern Brazil. The percentage of losses was low, below 4.0%.

Possible study limitations arise from the difficulty in reporting intimate experiences, even through self-administered questionnaires, aggravated by the fact that interviews took place in the subject's household, which may have inhibited a number of women, especially adolescents. Furthermore, most sexual behaviors investigated, including condom use, referred only to the last sexual intercourse. On the other hand, asking subjects about longer periods can lead to recall bias and to the reporting of idealized rather than concrete behaviors. Moreover, UNAIDS and other international entities include condom use during last sexual intercourse and not current use as an indicator of risk behavior (<http://www.cpc.unc.edu/measure/publications/unaid5-00.17e/panel5.html#8>, accessed on 01/Oct/2004). Finally, the low level of schooling of a number of subjects may have affected their answering the self-administered questionnaire.

Another potential problem was the evaluation of sexual behavior and condom use solely through women's reports. The reliability of sexual behaviors reported by North American adolescents was investigated by Brener et al.<sup>10</sup> The authors demonstrated Kappa agreement rates of 71.0% for onset of sexual activity before age 13, 81.0% for a lifetime history of four or more sex partners, and 48.0% for four or more partners in the previous three months. On the other hand, Zenilman et al.<sup>11</sup> observed among

high-STD/HIV-risk North American men and women that reported condom use was not associated with lower STD incidence. It is believed that the usual direction of information bias is to overestimate the real prevalence of condom use.

In the current study, prevalence of condom use during last sexual intercourse was 28.0%. In Pelotas, 42.0% of school-age adolescents (12-19 years) reported condom use during last intercourse<sup>12</sup>. In the present study, this rate was 47.0% for the 15-19-year group. In the international literature, condom use levels are still low, ranging from 3.2% during last intercourse in 16-72-year-old women in the Dominican Republic to 22.5% among adult British males during last heterosexual intercourse<sup>13,14,15,16</sup>. A Brazilian population-based study showed 21.0% condom use during the previous 12 months (69.0% in casual relationships) among sexually active 16-65-year-old women. In the 16-25-year group, the rate was 44.0% (53.0% in men and 35.0% in women). Generally speaking, the group that least used condoms was women in stable unions<sup>17</sup>. These data are confirmed in the present study, with greater condom use during last sexual intercourse among young and single women.

In the United States, sexually transmitted HIV and STDs were positively associated with low income, low schooling, and non-white color<sup>5,18,19</sup>. In Brazil, AIDS incidence in women with primary schooling (1<sup>st</sup>-8<sup>th</sup> grades) was 53.0% greater than among those with secondary education (9<sup>th</sup>-11<sup>th</sup> grades)<sup>3</sup>. The present study demonstrated a positive association between schooling and condom use. However, non-white color was also associated with greater condom use, the association gaining significance after adjustment for age and schooling. The effect of income was not demonstrated. Physical exercise lost significance after adjustment, possibly due to confounding with age.

Concerning early sexual debut, we observed that 47.0% of women had experienced sexual intercourse before age 18. In Brazil, a nationwide survey (1998) showed that 68.0% of women between ages 15 and 19 years were already sexually active<sup>17</sup>. Despite the lack of comparability between these percentages, they indicate that early sexual debut is a frequent phenomenon. In a North American survey, early sexual debut was associated with lower rates of condom use<sup>5</sup>. Such an association was not observed in the present study, where bivariate analysis suggested a positive association between condom use and early sexual debut. This association did not remain significant after ad-

justment, probably due to confounding with age, since younger women, who reported the highest levels of condom use, were also those who began sexual activity the earliest.

As to anal intercourse, the prevalence was of 3.0% in last sexual intercourse. Such prevalence rates varied in different studies conducted last year, between 7.0% and 9.0% among 16-59-year-old British and American women, respectively<sup>15</sup>. In the last sexual encounter of school-age adolescents (12-19 years), reported prevalence of anal intercourse was 7.0%<sup>12</sup>. In the present study there was no association between anal intercourse in last sexual encounter and condom use.

Some 7.0% of the women had practiced sexual intercourse with two or more partners during the three months preceding the interview. In the United States, among 15-44-year-old single women, this rate varied from 6.6% to 8.4%<sup>15,20</sup>. As to the higher rate of condom use among women with two or more partners in the previous three months, no further papers dealing with this issue could be located. However, in the above-mentioned nationwide survey, 70.0% of women reported using condoms in casual relationships<sup>17</sup>.

The results of the present study demonstrate that most women, especially those in stable unions, report not using condoms. Condom use was more frequent among women that were younger, with more schooling, non-white, single, and with more sex partners during the previous three months. One could assume that these groups, due to a greater awareness of their risk, would also be aware of the need for prevention. Risk perception, however, was not associated with condom use, which indicates that there are probably other mechanisms involved in this practice. Other analyses have demonstrated that women do not correctly evaluate their risk levels<sup>8</sup>. The fact that adult women in stable unions and with fewer partners are those that use condoms the least should suffice to place this group under the public health focus, with implications for preventive campaigns as well. The reasons for the current study's results should be further investigated (especially in qualitative studies) in order to aid the elaboration of more efficient strategies for promotion of condom use by women.

## Resumo

*Este estudo investigou a prevalência de fatores associados com o uso de preservativos na última relação sexual em mulheres de 15-49 anos de idade, de uma amostra probabilística da área urbana de Pelotas, Sul do Brasil. Um questionário administrado por uma entrevistadora investigou características sócio-econômicas e hábitos pessoais e outro, auto-aplicado, foi utilizado para investigar variáveis relacionadas ao comportamento sexual. Na análise dos dados foi utilizada a regressão de Poisson, segundo um modelo hierárquico, com 1.543 mulheres incluídas, sendo as perdas e recusas de 3,5%. A prevalência do uso de preservativos na última relação sexual foi de 28,0%. Esse uso esteve associado positivamente com menor idade, maior escolaridade, cor não branca, ser solteira e ter tido maior número de parceiros nos últimos três meses. Sugere que o grupo mais vulnerável a DST/AIDS devido ao não uso de preservativos são as mulheres brancas, adultas, em uniões estáveis e com menos parceiros sexuais.*

*Síndrome de Imunodeficiência Adquirida; Doenças Sexualmente Transmissíveis; Comportamento Sexual; Saúde da Mulher; Fatores de Risco*

## Contributors

M. F. Silveira participated in the research design, field work, data analysis, and drafting of the paper. I. S. Santos and C. G. Victora participated in the analysis and drafting of the paper. J. U. Béria, B. L. Horta, and E. Tomasi participated in the research design and analysis.

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