# Sexual behaviours, perception of risk of HIV infection, and factors associated with attending HIV post-test counselling in Ethiopia

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**Objectives**: To describe sexual behaviours, perception of risk of HIV infection, and factors associated with attending HIV post-test counselling (PTC) among Ethiopian adults.

**Methods**: Data on socio-demographic characteristics, knowledge of HIV infection, sexual history, medical examination, and HIV and syphilis serological status were compared, through uni- and multivariate analysis, in relation to attending PTC within 60 days of HIV testing.

**Results**: Between February 1997 and June 1998, 751 factory workers were enrolled in a cohort study of HIV infection progression. Despite reporting high-risk sexual behaviours, mainly for males (64% of males and 6% of females had more than five sexual partners in their lifetime, 16% of males and 2% of females reported having had recent casual partners), and knowing that HIV is commonly transmitted heterosexually in Ethiopia (97% of answers being correct, both genders combined), only 17% of males and 2% of females acknowledged having had activities which had put them at risk of HIV infection. HIV prevalence was 12%, and did not differ by gender. Of all study participants, 327 (43.5%) returned for PTC within 60 days of HIV testing. PTC attendance did not differ by age, gender, or HIV serological status. Factors independently associated with PTC attendance in males were: good knowledge of HIV infection, [odds ratio (OR) = 1.66], belief that medical follow-up improves the course of HIV infection (OR = 2.02), history of genital symptoms (OR = 2.83), positive syphilis serology (OR = 2.62), recent weight loss (OR = 1.89), and, with a negative association, being a manual worker (OR = 0.40), and history of recent casual sexual relationships (OR = 0.35). In women, belief that HIV/AIDS can be cured (OR = 3.16), never having been married (OR = 5.02), having five or less children (OR = 2.16), having been raped (OR = 3.42), and having used health facilities in the past year (OR = 1.73) were all positively and independently associated with PTC attendance.

**Conclusion**: Study participants reported high-risk sexual behaviours, yet had a low perception of individual risk. Men attended for PTC because of their knowledge of HIV infection, their past sexual history or their current health status. Women

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attended for PTC because of their plans for the future, marriage and/or children, rather than their past sexual exposure. Only in cases of rape were they willing to learn of their HIV status.

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## Introduction

Counselling is an important intervention in HIV/AIDS prevention and control. Studies from industrialised and developing countries have demonstrated substantial reduction of high-risk sexual behaviour after under-going HIV testing and post-test counselling (PTC) [1–7], although some studies were non-conclusive [8,9]. UNAIDS encourages countries to make voluntary HIV testing and counselling available [10].

Counselling includes two essential steps: the pre-test counselling, during which the emotions and concerns of individuals about their risks and behaviours are expressed, the technical aspects of HIV testing are clarified, the need for testing is assessed, and the implications of the test results are explored; and the PTC, during which the HIV test result is delivered, the HIV prevention measures are discussed, and psychological support adapted to the situation is provided, with referral as needed [11]. Considering the personal implications of knowing one's HIV status, it might be expected that everyone would want to get tested, particularly in areas of high HIV prevalence like urban Africa, if good quality testing is available and affordable. However, the fear of learning HIV status, with no effective treatment available (i.e., combination antiretroviral therapy is hardly available in Africa), result in under-utilization of testing services. Studies on the causes of failure to return to PTC give an insight into why people may not want to learn their HIV status, and on how pre-test counselling information should be adapted to overcome these reasons. For example, when female health care users in Africa were offered free HIV testing, a positive HIV test result was associated with failure to return to PTC, suggesting a self-perception of risk [12,13]. However, such studies need to be repeated, since motivations for attending counselling may vary depending on, among other factors, the cultural background of the individuals studied, the magnitude of the HIV epidemic in the study area, the method of recruitment of study participants (e.g. health care users or not), their knowledge of HIV/AIDS, their perception of risk, and their sexual behaviours.

As in most other countries of sub-Saharan Africa, Ethiopia has been experiencing a severe HIV epidemic for the past decade [14,15]. The estimated number of HIV-infected cases was 2 600 000 in 1997, so this country has the third largest HIV-infected population in the world [16]. Voluntary HIV testing and counselling are currently being introduced in the country, and increased knowledge of sexual behaviours and of perception of HIV infection risk among Ethiopians will help when designing strategies to maximise the use of these services.

In this paper, we present the results of a study on the association between socio-demographic characteristics, knowledge of HIV infection, sexual behaviours, perceived risk of infection, past and current medical history, and attending PTC among factory workers participating in a cohort study on HIV infection progression in Ethiopia.

## Materials and methods

This investigation was conducted as part of a cohort study on the progression of HIV-1 infection among factory workers in a suburban area of Addis Ababa, the capital city of Ethiopia. The study population consisted of all employees at the Fiber Products Factory, aged 18–46 years (n = 1060), and included mainly operators of the factory machinery, maintenance, administrative, and medical staff. The factory workers were informed about the objectives of the cohort study during general information meetings, and workers interested in participating were invited to come to the Ethiopian Netherlands AIDS Research Project's (ENARP) clinic on site. As an incentive to participate, factory workers and their families were offered free medical care for the duration of the cohort study. The project's clinic is two hundred meters away from the entrance of the factory, and open from Monday to Friday between 8:00 a.m. and 3:30 p.m.

After signing an informed consent form, each study participant was given pre-test counselling by an experienced counsellor. During the session, the participant's knowledge of HIV transmission, prevention, and course of infection was evaluated; his/her perception of risk of being HIV-infected was assessed and discussed; and his/her understanding of the potential consequences of a positive or negative HIV antibody test result was evaluated. Finally, all individuals were informed that their HIV test results would be available

30 days later at the project's clinic. Attending PTC was optional, although an appointment date was given in writing to all individuals. It was also made clear that the appointment date was tentative, and could be changed to another during the working hours of the clinic to suit. During the entire study period, only one counsellor (T.A.) administered pre- and post-test counselling to all study participants. After pre-test counselling, data on socio-demographic characteristics, sexual behaviours, and medical history were collected by a gender-matched interviewer, using a structured questionnaire. The interview was followed by a clinical examination, performed by a medical doctor, that entailed systematically looking for any of the conditions listed in the WHO staging system for HIV infection and disease [17]. Finally, blood was drawn for HIV and syphilis antibody testing.

Blood samples were transported to ENARP's laboratory at the Ethiopian Health and Nutrition Research Institute (EHNRI) on the same day. Serum samples were tested for HIV-1 antibodies by HIVSPOT (Genelabs Diagnostics, Singapore) and Vironistika ELISA (Organon, Boxtel, the Netherlands). Sera reacting positive with any or both tests were confirmed by western blot testing (HIV Blot 2.2 Genelabs Diagnostics, Singapore). Serum was also tested for syphilis using the *Treponema pallidum* Hemaglutination Test (TPHA; Serodia-TP, Fujirebio, Tokyo, Japan) and if found to be positive a further sample was tested using the Rapid Plasma Reagin (RPR) test (RPR Slide-Test, Biomerieux, France). A positive TPHA result with a positive RPR result were interpreted as indicating active or recently treated syphilis infection, whereas a positive TPHA result and negative RPR result were interpreted as indicative of a cured syphilis infection. All study information was coded and kept confidential. The EHNRI Ethics Committee and the National Ethical Clearance Committee have approved the study protocol.

Data were entered into a computer and analysed using the STATA statistical package (Stata Statistical Software, Stata Corporation, College Station, Texas, USA). Proportions and means were compared using $\chi^2$-square and Mann–Whitney *U* test where appropriate ($P<0.05$ was considered statistically significant). Trends were assessed using a non-parametric test for trend across ordered groups [18]. Attendees at PTC were defined as participants who came for PTC within 60 days after giving blood for HIV antibody testing. Participants who came to PTC after 60 days or who did not come at all were categorised together as non-attendees. For all variables (except age), the odds ratio (OR) describing the association with PTC attendance in univariate analysis was calculated in a logistic regression model; dummy variables for four age categories were included as a way to adjust for age. Multivariate analysis of predictors for attending PTC was done using a logistic regression model. Logistic regression modelling was performed through step-wise modelling including all variables with a univariate *P*-value < 0.25.

## Results

Out of 1060 eligible candidates, 751 (71%) factory workers were enrolled in the cohort study of HIV infection progression between February 1997 and June 1998 (407 males and 344 females). The participation for males and females was pretty similar, 74% (407/552) and 68% (344/508), respectively, although statistically significantly different ($P = 0.03$). Participation decreased with age, being 129/142 (90.8%) in males less than 35 years, and 278/410 (67.8%) in males 35 years or more ($P < 0.001$), and 162/215 (75.3%) in females less than 35 years and 182/293 (62.1%) in females 35 years or more ($P = 0.002$). The distribution of socio-demographic characteristics of the study population is given in Tables 1 and 2. In summary (percentages are given as follows for males and females, respectively), most of the study participants were 30–44 years of age (89% and 76%), were manual workers (91% and 94%), had education less than grade 6 (51% and 79%), were married and living with their spouse (82% and 77%), and were resident of the factory area for more than 20 years (62% and 71%).

The knowledge of HIV/AIDS of the study participants was high (% for males and females respectively; Tables 1 and 2): 98% and 97% knew that heterosexual transmission was the most common way of HIV spread in Ethiopia; 61% and 53% suggested condoms as the best way to prevent HIV transmission, apart from abstinence or mutual monogamy; 99% in each gender knew that HIV infection could be asymptomatic; and 43% and 39% gave correct answers to a total of five questions on the following four aspects: HIV transmission, HIV prevention, presence of a symptom-free period, and unavailability of a radical cure for HIV infection facts. Good knowledge of HIV/ AIDS (i.e., correct answers to all questions) was strongly correlated with educational level (test for trend across five educational categories, $P < 0.001$).

High-risk sexual behaviour was more commonly reported by males when compared with females (% for males and females, respectively; Tables 3 and 4): 64% and 6% acknowledged more than five sexual partners in their lifetime ($P < 0.001$), and 16% and 2% reported casual sexual partners in the past year ($P < <0.001$). Condom use was low: 1% and 2% in the last sexual act with spouse, and 18% and 0% in the last sexual act with casual partners. Although 17% and 2% acknowledged

**Table 1.** Relationship of socio-demographic characteristics and knowledge on HIV/AIDS of male workers, to attending the first post-test counselling (PTC) session within 60 days after enrolment at the Akaki Fiber Factory, 1998.

| Variable | n (%) | Number attending PTC (%) | Age-adjusted OR[a] (95% CI) Univariate | Age-adjusted OR (95% CI) Mulivariate[b] |
|---|---|---|---|---|
| Age: | | | | |
| 20–24 years | 7 (1.7) | 28.6 | 1.00 | 1.00 |
| 25–29 years | 38 (9.3) | 26.3 | 0.89 (0.15, 5.36) | 1.42 (0.22, 9.03) |
| 30–34 years | 84 (20.6) | 42.8 | 1.88 (0.34, 10.22) | 2.58 (0.45, 14.80) |
| 35–39 years | 118 (29.0) | 44.1 | 1.97 (0.37, 10.56) | 2.28 (0.40, 12.88) |
| ≥ 40 years | 160 (39.3) | 44.4 | 1.99 (0.38, 10.59) | 2.87 (0.51, 16.10) |
| Education: | | | | |
| Illiterate (< grade 1) | 67 (16.5) | 41.8 | 1.00 | – |
| Grade 1–6 | 142 (34.9) | 42.3 | 1.08 (0.59, 1.96) | – |
| Grade 7–12 | 107 (26.3) | 43.0 | 1.18 (0.62, 2.22) | |
| Grade 12 complete | 59 (14.5) | 42.4 | 1.12 (0.54, 2.31) | |
| Education after grade 12 | 32 (7.9) | 37.5 | 0.89 (0.37, 2.14) | |
| Marital status: | | | | |
| Married | 332 (81.8) | 43.1 | 1.00 | – |
| Single, never married | 59 (14.5) | 35.6 | 0.82 (0.44, 1.54) | – |
| Divorced/Separated | 12 (3.0) | 41.7 | 0.89 (0.28, 2.87) | – |
| Widowed | 3 (0.7) | 33.3 | 0.62 (0.06, 6.96) | – |
| Number of children: | | | | |
| ≤ 5 children | 357 (88.2) | 40.6 | 0.60 (0.32–1.12) | – |
| > 5 children | 48 (11.8) | 54.2 | 1.00 | – |
| Manual workers: | | | | |
| No | 35 (8.6) | 60.0 | 1.00 | 1.00 |
| Yes | 372 (91.4) | 40.3 | 0.47 (0.23, 0.95) | 0.40 (0.19, 0.85) |
| Good knowledge on HIV/AIDS: | | | | |
| No | 233 (57.3) | 37.3 | 1.00 | 1.00 |
| Yes | 174 (42.8) | 48.3 | 1.62 (1.08, 2.42) | 1.66 (1.08, 2.55) |
| Belief that good medical follow-up modifies the course of HIV infection: | | | | |
| No | 53 (13.0) | 28.3 | 1.00 | 1.00 |
| Yes | 352 (87.0) | 44.1 | 1.95 (1.03, 3.70) | 2.02 (1.03, 3.96) |
| Belief that AIDS can be definitely cured: | | | | |
| No | 383 (94.1) | 42.3 | 1.00 | – |
| Yes | 24 (5.9) | 37.5 | 0.79 (0.33, 1.87) | – |
| Health facility visit in the past 12 months: | | | | |
| No | 80.(19.7) | 35.0 | 1.00 | – |
| Yes | 326 (80.3) | 43.6 | 1.47 (0.88, 2.46) | – |

OR[a], odds-ratio; CI, confidence interval. [b]Multivariate analysis includes all variables from Table 1 and 3 that retained significant ($P < 0.05$) association with PTC after introduction in the model.

having had sexual activities that had put them at risk of HIV infection in the past, only 1% in each gender said that there was a slight chance that their HIV test result would be positive. Acknowledging having put themselves at risk for HIV infection was associated in males with number of lifetime partners ($P = 0.001$), report of recent casual partners ($P = 0.001$), and HIV infection ($P = 0.03$). However, the proportion of males acknowledging such risk remained low (38/406 = 17%), even among those with recent casual partners (20/66 = 30%). None of the six females reporting recent casual partners considered having put themselves at risk for HIV infection in the past.

The prevalence of HIV infection was 11.6% and 12.2% ($P > 0.05$), and of positive syphilis serology (TPHA), 31% and 24% ($P = 0.03$). Acknowledging recent casual partners correlated with positive HIV test results ($P = 0.03$), and number of lifetime sexual partners was strongly associated with positive TPHA test result (test for trend, $P < 0.001$). Positive HIV and TPHA test results were strongly correlated as well ($P < 0.001$). Self-perception of HIV infection status could be influenced by health condition. During the medical examination at the enrolment visit (% for males and females, respectively), 78% and 69% were found to be asymptomatic; however, among other conditions, 13% and 23% reported some recent weight loss (> 5% of their body weight), 3% in each gender were diagnosed with oral candidiasis, and 3% and 4% were diagnosed with pulmonary tuberculosis. Having pulmonary tuberculosis, oral candidiasis, or history of genital symptoms was positively correlated with HIV serological status ($P < 0.05$ for all three associations). Weight loss was not associated with HIV status ($P = 0.12$).

The proportion of study participants who said that they wanted to know their HIV serostatus during the pre-test counselling was extremely high: 98% and 99% in males and females, respectively. Only 472/751 (63%), however, attended PTC, including 327 (43%) within 60 days of enrolment. The distribution of time to PTC of the 472 people who came for PTC is shown in Fig. 1. The majority (69%) returned within 60 days, and the

**Table 2.** Relationship of socio-demographic characteristics and knowledge on HIV/AIDS of the female workers by attending the first post-test counselling (PTC) session within 60 days after enrolment at the Akaki Fiber Factory, 1998.

| Variable | n (%) | Number attending PTC (%) | Age-adjusted OR[a] (95% CI) Univariate | Age-adjusted OR (95% CI) Multivariate[b] |
|---|---|---|---|---|
| Age: | | | | |
| 20–24 years | 17 (4.9) | 35.3 | 1.00 | 1.00 |
| 25–29 years | 66 (19.2) | 39.4 | 1.19 (0.39, 3.62) | 1.04 (0.33, 3.29) |
| 30–34 years | 79 (23.0) | 44.3 | 1.46 (0.49, 4.33) | 1.52 (0.50, 4.62) |
| 35–39 years | 98 (28.3) | 50.0 | 1.83 (0.63, 5.35) | 2.34 (0.78, 7.02) |
| ≥ 40 years | 84 (24.4) | 47.6 | 1.67 (0.56, 4.92) | 2.37 (0.77, 7.29) |
| Education: | | | | |
| Illiterate (< grade 1) | 112 (32.6) | 41.1 | 1.00 | – |
| Grade 1–6 | 160 (46.5) | 45.0 | 1.30 (0.78, 2.18) | – |
| Grade 7–12 | 55 (16.0) | 49.1 | 1.98 (0.95, 4.15) | – |
| Grade 12 complete | 7 (2.0) | 71.4 | 3.82 (0.70, 20.91) | – |
| Education after grade 12 | 10 (2.9) | 60.0 | 2.53 (0.66, 9.68)[c] | – |
| Marital status: | | | | |
| Married | 268 (77.9) | 44.4 | 1.00 | 1.00 |
| Single, never married | 11 (3.2) | 72.7 | 4.30 (1.07, 17.19) | 5.02 (1.24, 20.38) |
| Divorced/Separated | 40 (11.6) | 45.0 | 0.93 (0.47, 1.83) | 1.00 |
| Widowed | 25 (7.3) | 44.0 | 0.92 (0.40, 2.13) | 1.00 |
| Number of children: | | | | |
| ≤ 5 children | 303 (88.1) | 46.9 | 2.09 (1.01, 4.31) | 2.16 (1.03, 4.56) |
| > 5 children | 41 (11.9) | 34.2 | 1.00 | 1.00 |
| Manual workers: | | | | |
| No | 21 (6.1) | 66.7 | 1.00 | – |
| Yes | 323 (93.9) | 44.0 | 0.41 (0.16, 1.04) | – |
| Good knowledge on HIV/AIDS: | | | | |
| No | 210 (61.1) | 43.3 | 1.00 | – |
| Yes | 134 (39.0) | 48.5 | 1.21(0.78, 1.88) | – |
| Belief that good medical follow-up modifies the course of HIV infection: | | | | |
| No | 47 (13.7) | 34.0 | 1.00 | – |
| Yes | 297 (86.3) | 47.1 | 1.69 (0.88, 3.24) | – |
| Belief that AIDS can be definitely cured: | | | | |
| No | 328 (95.4) | 44.2 | 1.00 | 1.00 |
| Yes | 16 (4.7) | 68.8 | 2.76 (0.93, 8.17) | 3.16 (1.05, 9.52) |
| Health facility visit in the past 12 months: | | | | |
| No | 82 (23.8) | 36.6 | 1.00 | 1.00 |
| Yes | 262 (76.2) | 48.1 | 1.66 (0.99, 2.79) | 1.73 (1.02, 2.95) |

[a]OR, odds-ratio; CI, confidence interval. [b]Multivariate analysis includes all variables from Tables 2 and 4 that retained significant ($P < 0.05$) association with PTC after introduction in the model. [c]Univariate analysis: $P = 0.02$ for an increase of 1 category of education.

percentage decreased rapidly thereafter. A second pick of returnees was observed after 180 days, corresponding to those attending PTC after their first follow-up visit for the cohort study (visits are scheduled every 6 months). For the rest of this report, attendees at PTC will be those who came within 60 days of enrolment in the study.

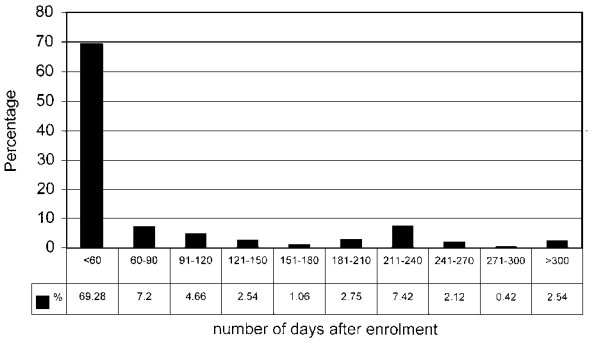


**Fig. 1.** Number of days between enrolment and post-test counselling among factory workers, Akaki, 1997–1998.

The proportion of participants attending PTC did not differ by gender (45% and 42% for males and females, respectively, $P > 0.05$). It also did not differ by HIV serological status (42% and 38% for HIV-negative and HIV-positive males, respectively, $P > 0.05$; 47% and 36% for HIV-negative and HIV-positive females, respectively, $P > 0.05$). Tables 1 and 3 for males, and tables 2 and 4 for females, summarise the association between attending PTC and socio-demographic characteristics, HIV knowledge, sexual behaviours, perceived risk of HIV infection, and medical history.

In males, variables independently and positively associated with attending PTC were a good knowledge of HIV/AIDS (OR = 1.66), the belief that medical follow-up improves the course of HIV infection (OR = 2.02), the reporting of genital symptoms (ulcer or discharge) in the past 5 years (OR = 2.83), a positive syphilis serology (RPR) (OR = 2.62), and recent loss of weight (OR = 1.89). Variables negatively associated with attending PTC were being a manual worker (OR = 0.40), and reporting recent (less than 1 year) casual

**Table 3.** Relationship of sexual behaviour and medical history of male workers by attending the first post-test counselling (PTC) session within 60 days after enrolment at the Akaki Fiber Factory, 1998.

| Variable | n (%) | Number attending PTC (%) | Age-adjusted OR[a] (95% CI) Univariate | Age-adjusted OR (95% CI) Multivariate[b] |
|---|---|---|---|---|
| Lifetime sexual partner: | | | | |
| < 5 partners | 143 (35.9) | 39.8 | 1.00 | – |
| ≥ 5 partners | 255 (64.1) | 43.1 | 1.09 (0.71, 1.66) | – |
| Sexual intercourse with casual partner in past 12 months: | | | | |
| No | 341 (83.8) | 44.9 | 1.00 | 1.00 |
| Yes | 66 (16.2) | 27.3 | 0.47 (0.26, 0.86) | 0.35 (0.17, 0.62) |
| Genital symptoms of STD[c] in the past 5 years: | | | | |
| No | 356 (87.5) | 40.5 | 1.00 | 1.00 |
| Yes | 51 (12.5) | 52.9 | 1.79 (0.98, 3.29) | 2.83 (1.44, 5.59) |
| Acknowledged at risk for HIV infection through past activities: | | | | |
| No | 338 (83.3) | 42.0 | 1.00 | – |
| Yes | 68 (16.8) | 42.7 | 1.07 (0.63, 1.84) | – |
| TPHA[c]: | | | | |
| Negative | 280 (68.8) | 39.6 | 1.00 | – |
| Positive | 127 (31.2) | 47.2 | 1.29 (0.84, 1.98) | – |
| RPR[c]: | | | | |
| Negative | 366 (89.9) | 39.9 | 1.00 | 1.00 |
| Positive | 41 (10.1) | 61.0 | 2.26 (1.16, 4.41) | 2.62 (1.30, 5.29) |
| HIV: | | | | |
| Negative | 360 (88.4) | 42.5 | 1.00 | – |
| Positive | 47 (11.6) | 38.3 | 0.85 (0.45, 1.60) | – |
| Weight loss: | | | | |
| No | 348 (86.6) | 40.5 | 1.00 | 1.00 |
| Yes | 54 (13.4) | 53.7 | 1.76 (0.98, 3.17) | 1.89 (1.02, 3.51) |

[a]OR, odds-ratio; CI, confidence interval. [b]Multivariate analysis includes all variables from Tables 1 and 3 that retained significant ($P < 0.05$) association with PTC after introduction in the model. [c]STD, Sexually transmitted disease; TPHA, *Treponema pallidum* Haemaglutination test (syphilis); RPR, Rapid Plasmin Reagin test.

sexual partners (OR = 0.35). The association between reports of recent casual partners and low attending PTC was further studied by breaking down males with recent casual partners according to their acknowledgement of activities putting them at risk for HIV infection in the past: when compared to males with no recent casual partners (n = 341, PTC attendance = 45%), those acknowledging high-risk activities had similar attendance rate (n = 20, PTC attendance = 40%, $P = 0.67$), whereas those denying high-risk activities had lower attendance rate (n = 46, PTC attendance = 22%, $P = 0.003$).

For females, variables independently and positively associated with attending PTC were always having been single (OR = 5.02), having five or less children (OR = 2.16), belief that HIV/AIDS can be cured (OR = 3.16), having been raped (OR = 3.42), and having used health services in the past year (OR = 1.73). The association between marital status and attending PTC was further complicated by the strong and positive association between never having been married and level of education (odds of never having been married for an increase of one level of education was 4.13, $P < 0.001$). Although there was no association between level of education and attending PTC in women who had never been married, there was a positive association between increasing education and attending PTC in married women (odds of attending PTC for an increase of one level of education in married women was 1.36, $P = 0.05$). With regard to the association between PTC attendance and number of children, when number of children was considered as the independent variable, rather than using a cut-off level of five children, the odds of attending post-test counselling would have been 0.90 per additional child; however, the association would have become marginally significant ($P = 0.08$).

## Discussion

This study is based on a fairly stable urban population of Ethiopia. Most study participants were mid-adults (mean age = 36 years), married, employed, and long-term residents of the area. Their general knowledge on HIV/AIDS was good, as has been observed previously, in 1994, for other Ethiopian urban adults among whom 94% of males and 84% of females were able to cite two acceptable ways of protection from HIV infection [18]. The good results of the 1994 survey were attributed to the intervention efforts of the Ethiopian AIDS Control Programme, other ministries, and non-governmental organizations in raising knowledge of HIV/AIDS. For our study participants, in addition to their possible

**Table 4.** Relationship of sexual behaviour and medical history of the female workers by attending the first PTC session within 60 days after enrolment at the Akaki Fiber Factory, 1998.

| Variable | n (%) | Number attending PTC (%) | Age-adjusted OR[a] (95% CI) Univariate | Age-adjusted OR (95% CI) Multivariate[b] |
|---|---|---|---|---|
| Lifetime sexual partner: | | | | |
| < 5 partners | 320 (93.6) | 44.7 | 1.00 | – |
| ≥ 5 partners | 22 (6.4) | 54.6 | 1.48 (0.61, 3.55) | – |
| Sexual intercourse with casual partner in past 12 months: | | | | |
| No | 338 (98.3) | 45.3 | 1.00 | – |
| Yes | 6 (1.7) | 50.0 | 1.26 (0.25, 6.44) | – |
| Ever been raped: | | | | |
| No | 321 (94.7) | 44.2 | 1.00 | 1.00 |
| Yes | 18 (5.3) | 66.7 | 2.82 (1.01, 7.86) | 3.42 (1.20, 9.79) |
| Genital symptoms of STD[c] in the past 5 years: | | | | |
| No | 278 (80.8) | 46.0 | 1.00 | – |
| Yes | 66 (19.2) | 42.4 | 0.84 (0.48, 1.47) | – |
| Acknowledged at risk for HIV infection through past activities: | | | | |
| No | 336 (97.7) | 44.6 | 1.00 | |
| Yes | 8 (2.3) | 75.0 | 3.38 (0.67, 17.11) | |
| TPHA[c]: | | | | |
| Negative | 261 (76.1) | 43.7 | 1.00 | – |
| Positive | 82 (23.9) | 51.2 | 1.30 (0.78, 2.15) | – |
| RPR[c]: | | | | |
| Negative | 320 (93.3) | 45.6 | 1.00 | – |
| Positive | 23 (6.7) | 43.5 | 0.86 (0.36, 2.03) | – |
| HIV: | | | | |
| Negative | 301 (87.8) | 46.8 | 1.00 | – |
| Positive | 42 (12.2) | 35.7 | 0.67 (0.34, 1.33) | – |
| Weight loss: | | | | |
| No | 263 (77.4) | 46.8 | 1.00 | – |
| Yes | 77 (22.7) | 40.3 | 0.77 (0.46, 1.30) | – |

[a]OR, odds-ratio; CI, confidence interval. [b]Multivariate analysis includes all variables from Tables 1 and 3 that retained significant ($P < 0.05$) association with PTC after introduction in the model. [c]STD, Sexually transmitted disease; TPHA, *Treponema pallidum* Haemaglutination test (syphilis); RPR, Rapid Plasmin Reagin test.

exposure to these interventions, information meetings were organised in the factory over a 1-year period as a preparation for the cohort study. During these meetings, various educational messages on HIV/AIDS were delivered to the factory workers. Despite their good knowledge on HIV transmission and prevention, many workers reported high-risk sexual behaviours, particularly among males (64% acknowledged more than five sexual partners in their lifetime, and 17% recent casual sexual partners). Although condom use was cited by more than 50% of study participants as a proper way to prevent HIV transmission during casual sex, only 18% of males, and 0% of females, had used condoms during their last casual encounter. As a result, HIV prevalence was high, 12%, similar to that of Addis Ababa, the nearby capital city of Ethiopia [14]. These findings illustrate that in this population, as already observed elsewhere, increased knowledge does not necessarily translate into changes in behaviour [19,20].

What may be missing in our study population for changes in behaviour to occur is perception of personal risk of HIV infection, this being a precondition for adaptive change in some theories [21]. Indeed, in a population where condom use was very low, only 30% of males with recent casual partners believed that they had put themselves at risk for HIV infection in the past.

During pre-test counselling, a very high proportion (98.4%) of study participants said that they wanted to know their HIV test result. However, only 63% returned for PTC, and 44% within 60 days of HIV testing. Slightly higher attending PTC was found in other studies among health care users in Rwanda (69%) and in Ivory Coast (78%) [12,13], and lower attendance (14%) among factory workers in Tanzania, a population that is more similar to this study's [22]. In our analysis we defined PTC attendees as only those participants who returned for PTC within 60 days after HIV testing. We thought it was more likely that participants coming within 60 days would be those with strong motives for learning their HIV status, whereas those coming later might do so because of peer pressure, or intervening events, such as transient illness. It may be seen from Fig. 1 that most (69%) of participants who came for PTC did so during the first 2 months after enrolment.

Some predictors of attending PTC in men may have logical interpretations. Attending PTC was higher among men with good knowledge on HIV infection, as found in previous studies [23], suggesting that proper information helps people in making their decision. This was independent of educational status, which itself did not show any association with counselling attendance.

Despite the absence of antiretroviral drugs in Ethiopia, 87% of males thought that a good medical follow-up would improve the course of HIV infection, a notion itself associated with higher attending PTC, and therefore worth discussing during pre-test counselling. More difficult to explain is the association in males between reported sexual behaviours, perception of risk of HIV infection, biological and medical indicators of sexual behaviours, and attending PTC. Three factors predicted attendance: two with a positive association (reporting past genital symptoms and having a positive syphilis serology), and one with a negative association (reporting recent casual partners). These factors should be analysed independently of each other since their effect was found to be individually significant in multivariate analysis. Individuals reporting genital symptoms in the past may be concerned by the physical evidence of sexually transmitted disease, and with the knowledge that this indicates a risk having occurred, may be anxious to know their HIV status. Males with a positive syphilis serology, although reporting more lifetime partners, did not portray themselves as having had activities putting them at risk of HIV infection in the past. Unless their syphilis infection was contracted through their spouse/regular partner, it is likely that it reflects a higher sexual activity, or sexual contacts with higher risk partners, which was under-reported during the interview. Under this assumption, their higher attending PTC might be interpreted as their knowledge of their high-risk behaviours, and anxiety to learn their HIV status, which they would not acknowledge during an interview. Finally, males who reported recent casual partners were reluctant to learn their HIV test results (OR = 0.35). This was only true for a subgroup of them who also denied having had activities putting them at risk of HIV infection in the past. Changing their perception of personal risk of HIV infection may be the necessary preliminary step before expecting them to attend PTC.

The two remaining predictors of attending PTC in males were weight loss and manual work. Weight loss is associated with HIV infection in Africa ('slim' disease), and higher attending PTC of those reporting weight losses would reflect their legitimate worry about being sick. It is surprising that the same association was not found with pulmonary tuberculosis, or oral candidiasis, which are also associated with HIV infection in the mind of many Ethiopians. Manual workers were less likely to attend PTC. This effect, independent of educational level, may be related to the fewer opportunities for manual workers to leave their job site during working hours, when compared to office staff. We thought that these time constraints would have been overcome by the possibilities offered to factory workers to attend PTC outside of their working hours, before or after their shift periods at the production lines (shifts change in the afternoon at 2:00 p.m.). The lower attendance of factory workers, however, may indicate that additional options for visiting the clinic should be made available to them.

Factors associated with attending PTC in females were less numerous. Very few women reported high-risk sexual behaviours, and none of these was associated with attending PTC. The low prevalence of high-risk behaviours is however in contrast with the high syphilis and HIV prevalence among women (24% and 12%, respectively), suggesting that either sexual behaviours are largely underreported by women, or that women get infected through their spouse or regular partner. Were the positive syphilis serology a reflection of women's high-risk sexual behaviours, it might have translated into a conscious decision for learning, or avoiding knowing, the HIV test result, as was observed in men. This was not the case. Women would rather portray themselves as not able to control their exposure to sexually transmitted infections, whether it is by suspecting their spouse or regular partner of having infected them (were they found HIV-positive; data not shown), or by reporting a history of rape (5% of women). Moreover, reporting a history of rape was associated with higher attending PTC, suggesting that the rapist be also viewed as a potential virus transmitter.

Some women may have used PTC to plan their future marital life: one example is the higher attendance among unmarried women, as in other studies in which young adults requested a HIV test before getting married [7]. Another is the higher attendance in women with fewer children, which could be explained by their concern of transmitting HIV infection to their offspring during future pregnancies. This finding is encouraging in view of the planned expansion of antiretroviral drugs use for the prevention of mother-to-infant transmission of HIV in Africa, where acceptance of HIV testing among pregnant women is a pre-condition for the success of the intervention. The last two predictors of attending PTC were related to the health benefit expected from learning HIV status and to the use of health services in general. Belief that HIV/AIDS could be cured, although reported by very few women (5%), was a motivation for learning HIV test result. However, belief that a good medical follow-up would improve the course of HIV infection, a more realistic expectation shared by 86% of women, was not associated with higher attending PTC. Finally, attendees of health facilities in the past year were more likely to return for PTC, maybe as they were health services users in general.

These important findings should be interpreted with caution, since there are some important limitations to the study. Firstly, the overall participation was 71%, and non-participants might have had a different attitude towards PTC attendance than participants. The

decision to join the study was based on a series of factors among which availability of HIV testing and counselling was only one. Other factors were the provision of free medical care to the study participants and their families, and 6-monthly check-ups that included clinical examination by a medical doctor, blood tests (haemoglobin, white blood cells counts, syphilis testing), and stool examination (diagnosis of intestinal parasites). The only information we have on non-participants is their age and gender. There were more females and older individuals amongst the non-participant than participant group. In our study, neither age, nor gender, were associated with PTC attendance. Therefore, it is difficult to know whether non-participants' different PTC attendance can be attributed to age or gender differences. It seems reasonable to assume that people who did not participate in the study would have been less likely to attend PTC as they were probably less interested in health services in general.

Secondly the validity of self-reported behaviours is questionable [24]. In our study, although reported sexual behaviours correlated with biological indicators of sexually transmitted diseases, we cannot exclude a fair amount of non-random misclassification in the replies given by participants. Thirdly, certain interpretations of study results were quite speculative, and should be confirmed through additional research using other approaches (e.g., qualitative methods). Fourthly, generalizations based on findings from this particular populations may be inappropriate: for one thing, our study population was made of mid-adults, married, employed, with limited education and income, and not necessarily similar to a typical population attending a voluntary testing centre By further characterizing the study population into categories of HIV knowledge, sexual behaviours, and perception of risk of HIV infection, however, we identified predictors of PTC attendance relevant to any population that may come to voluntary testing centres, regardless of their socio-demographic characteristics. Study subjects were tested as part of the procedures of the cohort study, and not only as the result of a voluntary step to be tested. Attending PTC was entirely optional, however, and indeed 37% of subjects did not get their HIV test results. Attending PTC was therefore the result of a personal initiative, as it had been for attending a voluntary testing centre initially. Finally, the duration between pre- and post-test counselling may decrease in the future, with the opening of rapid HIV testing and counselling centres [25], and our findings would not necessarily apply to these situations. Never-the-less predictors of attending PTC identified in this study may be similar to those of attending the rapid HIV testing and counselling centres, and health professionals working in these centres may therefore benefit from our findings.

In conclusion, male study participants reported high-risk sexual behaviours. Yet despite their good knowledge on HIV transmission, few acknowledged that they had put themselves at risk for HIV infection. This discrepancy might be interpreted as an under-estimation of the personal risk taken during casual sex, and as being reluctant to admit exposure to HIV. However, the non-expressed anxiety related to high-risk behaviours might have translated into increased attending PTC for some men. These results differ from other studies, in women, in which perceived risk of HIV infection (using true HIV status as a proxy) was associated with avoidance of PTC [12,13]. Women were more likely to attend PTC based on their plans for the future (marriage and/or children), rather than on their past sexual exposure, over which they now had no control. Only in case of rape would they be willing to know their HIV status. In both genders, increased education, whether specifically on HIV/AIDS (males), or in general (married females), was associated with increased attending PTC. Finally, receiving appropriate medical care was perceived as a reason for learning HIV status, despite the limited therapy available for HIV/AIDS in Ethiopia. These findings may be useful for health care providers designing campaigns for voluntary testing, or revising the content of pre-test counselling sessions. Such surveys should however be repeated in other population groups, in Ethiopia and elsewhere, considering the large variability of results observed between different studies.

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