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FACTORS ASSOCIATED WITH THE ABSENCE OF HIV-1 INFECTION IN COMMERCIAL SEX WORKERS IN ADDIS ABABA, ETHIOPIA

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Factors associated with the absence of

HIV infection in

Commercial sex workers in Addis Ababa, Ethiopia.

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Mathias Aklilu,MD

DEDICATION

I WISH TO DEDICATE THIS THESIS TO my wife, **Beletech Tsegaye (MD)**, and my **children.**

TABLE OF CONTENTS

LIST OF TABLES

LIST OF ABBREVIATIONS

AIDS---------- Acquired immune deficiency syndrome

ANC---------- Antenatal care

CSW---------- Commercial sex workers

ELISA---------- Enzyme linked immunosorbent assay

ENARP---------- Ethio-Netherlands AIDS Research Program

GUD---------- Genital ulcer disease

HIV---------- Human immune deficiency virus

IDU---------- Intravenous drug users

MOH----------Ministry of health

MPSC---------- Multi-partner sexual contact

NACP---------- National AIDS control program

NGO---------- Non-governmental organization

PBMC---------- Peripheral blood mononuclear cells

RPR---------- Rapid plasma reagin

SES---------- socio-economic status

SSA---------- Sub Saharan Africa

STD---------- Sexually transmitted diseases

TPPA---------- Passive Particle Agglutination Test for the detection of Trepanoma Pallidum Antibodies

WHO---------- World health organization

LIST OF OPERATIONAL DEFINITIONS:

Commercial sex workers: For the purpose of this study commercial sex workers are those women who are involved in selling sex either directly or indirectly for earning their living (14, 26).

Regular clients: Are men who repeatedly visit the same woman for sex.

Clients: Any man who visits the sex worker and buys sex.

Consistent use of condoms: Implies using condoms in every sexual act.

HIV-1 negativity ---------- negative by two ELISA tests, or one ELISA positive only, and Western Blot negative.

HIV-1 positive ---------- positive by the two ELISA tests, or one ELISA positive only and Western Blot positive.

ABSTRACT

A cross-sectional survey was conducted from August to October 1998 in CSWs attending STD clinics of two health centers in Addis Ababa, Ethiopia. The objective of the study was to describe socio-demographic characteristics, behaviors of CSWs associated with HIV-1 infection. In addition, a sub-group of CSW who remained uninfected despite long years of sex work was identified and described in more detail. Purposive sampling was used for the survey. All CSWs willing to participate were interviewed by female nurses. Blood samples were taken from each respondent for HIV and syphilis test. Characteristics of CSWs were compared between groups using Chi-square and *t* test where appropriate. Identification of risk factors for HIV infection among CSW was performed using univariate and multivariate analysis (logistic regression model). A total of 312 CSWs were enrolled in the study. Their mean age was 25 years. Most of the study participants had little education (78.6% were less than grade 6). The mean duration of sex work was 5.5 years . Their workplaces included individually owned rooms (41.7%), followed by shared rooms (32,5%). Most of participants had already got instructions about safer sex while working as CSWs, and 43.0% of CSWs reported using male condoms in at least 95% of sexual acts with clients. In multivariate analysis, variables independently associated with a protective effect against HIV infection were: higher education (odds of HIV infection associated with an increase of one category of education: 0.75, 95% CI, 0.58-0.96), instruction by peers about sex work (OR: 0.47, 95% CI, 0.23- 0.96) and cleaning after sex with soap (OR, 0.49, 95% CI, 0.25-0.94). Variables independently associated with an increase in risk of HIV infection were: age 25-29 years (OR, reference category 15-19 years, 3.24, 95% CI,1.06-9.95), sharing rooms with other sex workers (OR, 3.33, 95%CI, 1.30-8.51), genital bleeding after sex (OR, 2.34, 95% CI, 1.01-5.41), and history of genital ulcer in the past years (OR, 2.89, 95% CI, 1.39-5.99). There was no association between number of years of sex work and HIV serostatus. Twenty five sex workers had more than five years of sex work and remained HIV negative. HIV prevalence was remarkably high (80.3%) among sex workers in Addis Ababa. Based on the results of this study, we recommend the strengthening of peer education programs and of early diagnosis and treatment of STDs. The protective effect of cleansing using soap after sex should be explored further. On the long run, creating alternative employment opportunities to sex workers should be strongly supported.

Introduction

HIV/AIDS situation in the world

Acquired immune deficiency syndrome (AIDS) has now been recognized for almost two decades. During this time it has killed millions of people and caused tremendous suffering. It has become a major obstacle for social, economic and health development. Available evidence to date indicates that the epidemic will be with us well into the future and its toll will mount. In most urban cities of sub- Saharan Africa, Western Europe and the Americas, AIDS has already become the leading cause of death for both men and women aged 15-49 years). It kills people in their most productive years and ranks as the leading cause of potential healthy life years lost in SSA [1,2]. Since the identification of the first AIDS cases in the early 80s in most countries , virtually all member states of the World Health Organization have developed National AIDS Control Programs (NACP) to curb the epidemic. But despite all the efforts in the prevention programs, the epidemic has continued to expand in all parts of the world.

According to the WHO report of 1995 the HIV/ AIDS epidemic has been spreading at a rate of over 6000 new infections per day , the most rapid increases being observed in Southern and Central Africa and in South Asia. As many as 50% of all new infections were in women aged 14-24 years [3]. UNAIDS has estimated that at the end of 1997, 30.6 million people in the world were living with HIV/AIDS of which 20.8 million or 68 % were in SSA [4]. By the year 2000, according to the WHO forecasts, around 40 million new infections will have occurred and of these 90% will be in developing countries [4].

HIV/AIDS situation in Africa and Ethiopia

There is a wide variation in HIV/AIDS prevalence in different countries and regions throughout the world. The first AIDS cases in Africa were reported from Rwanda, Zaire, and Uganda in 1983 [5]. Since then, there has been an alarming increase of HIV-1 prevalence in SSA. Africa itself is not uniformly affected by the epidemic probably due to differences in local migratory and behavioral patterns of the population which are the major determinants of the spread of the infection. Most affected countries of SSA are in eastern and southern Africa. However, the trend may reverse in some countries as it has already started in Uganda, where the prevalence has decreased from 1 million (12%) in 1994 to 0.8 million (9%) in 1997 [6].

In Ethiopia the first evidence for HIV-1 infection and AIDS cases were reported from Addis Ababa in 1984 [7] and in 1986 [8] respectively. The epidemic has spread rapidly ever since. In 1988, a nation wide sero-epidemiological survey carried out among CSWs in 23 urban areas of Ethiopia had revealed a mean HIV-1 prevalence rate of 17% with a range of 1.3% to 38.1% [17]. Since then, the epidemic has spread at an alarming rate. Data from blood donors indicate that 5 to 19% of them in ten major cities of Ethiopia were infected in 1994 (Ethiopian Red Cross Society, personal communication). The national adult prevalence was estimated to be 5.6% by the end of 1996 [9] and 7.4% by 1997 [10]. This implies that there were about 2.4 million HIV-1 infected adults in 1997.

In Addis Ababa a study conducted by ENARP using blood collected from a representative sample of 3,853 adults in 1994 revealed an HIV prevalence of 6% for men and 7% for females. The highest prevalence was in the age group 25-29 years, being 17.0% and 12.6% among males and females respectively [11]. According to the Ministry of Health report

of June 1998, there were a cumulative total of 61,281 AIDS cases in Addis Ababa and other few administrative regions [12]. However, correcting for under diagnosis and underreporting would bring this national figure close to 400,000. For the purpose of monitoring the trends of the HIV epidemic in Addis Ababa, sentinel surveillance sites among antenatal care attendants and CSWs were revitalized by the ENARP project in collaboration with Region 14 Health Bureau. HIV prevalence was 14 -20% among urban pregnant women and 47-59% among CSWs in 1996-7 (ENARP, personal communication).

CSWs, HIV infection risk, and resistance to infection

Since the beginning of the AIDS pandemic in the early and mid 80s, it has been thought that female CSW might constitute a high risk group for the transmission of HIV-1 infection, because of their high sexual activity and co-infection with other STDs[15,17,18]. Indeed, numerous sero- prevalence studies in Africa have shown high rates of infection among CSWs [4,15,16]. In Ethiopia, besides the initial 1988 national survey, further studies in Addis Ababa (1990) and other cities (Nazaret and Bahirdar, 1993-6), confirmed the high HIV prevalence among CSWs (24.7% and 65-70%, respectively) [9,10]

However there are few studies which indicate that some individuals despite having multiple risk behavior and exposure to the virus for long period of time (more than 3 –5 years) remain uninfected [19]. The simplest explanation would be that these individuals have escaped HIV-1 infection because of their different sexual behaviors [19, 23, 24]. However, in a few extreme cases, such an absence of HIV-1 infection is more likely related to biological host factors, such as specific cellular immune responses, or mutations in the gene coding for one HIV-1 chemokine co-receptor (necessary for viral entry into the cell) [19, 20,21,22].

A similar phenomenon may exist among CSWs of Addis Ababa. In 1996, 67/153 44% of the 153 CSWs tested in Addis Ababa were HIV-infected at two Region 14 Health Bureau/ENARP sentinel sites. Amongst the 86 HIV-1 negative study participants, 24 (28%) had worked for five or more years as CSW (ENARP, personal communication). The HIV-1 negativity of these latter CSW might be entirely due to lower risk sexual behavior, lower prevalence of the HIV-1 epidemic during their initial years of sex work, or selective death of HIV-1 positive CSW, resulting in an increase in the proportion of HIV-1 negatives amongst long term CSW. However genetic factors and/or natural and acquired immunological resistance might also contribute to this result.

In the present thesis, we describe the findings of a large study carried out among CSWs of Addis Ababa. Our aim was to identify socio-demographic and behavioural factors associated with protection against HIV among CSWs. These findings may be used for the design of strategies which would be helpful to reduce the spread of the epidemic among CSWs and their clients. In addition, in-depth laboratory analyses will be carried out on the blood samples of a few CSWs identified through this project, who have remained HIV-negative despite many years of high exposure to HIV. These analyses, carried out as part of the PhD project of one ENARP student, will help identifying immunological and genetic factors associated with resistance to HIV infection among Ethiopians.

Literature review

The aim of this literature review is to go over the few studies which have been done previously on the risk factors, and the different behaviors associated with HIV-1 infection in sex workers both globally and in Ethiopia.

Commercial sex workers (CSW) are a heterogeneous group in terms of their working environment, socio-economic and health status, knowledge and practice of protective measures (e. g condom use). CSW encompass a wide range of individuals who are directly and indirectly involved in sexual transactions [14,26]. They are a subset of the population who have multiple partners at one time or change their sexual partners frequently. Through their sexual activity they are frequently exposed to and acquire STDs. Once infected, again because of their high level sexual activity, they are efficient transmitters of STDs including HIV to others with similar behavior and at a lower rate to individuals who are less sexually active. The infection remains endemic among this small sub-population of highly sexually active individuals, from whom it spreads in mini-epidemics to the population at large [27]. According to Yorke, Hethcote and Nold, these sub-groups of the population have been termed high-frequency transmitter core groups [28]. In fact, it is not only the average rate of partner change in the population that determines the spread of HIV-1 infection, but also the way in which population sub groups mix sexually [29]. Such as many men having sexual relations with a smaller group of women (core groups). The occurrence of such form of sexual networking, rather than a uniformly high level of sexual activity, is probably the main explanation for rapid spread of HIV in Africa, particularly in urban areas [23,30].

The HIV-1 sero-prevalence rate among CSW vary considerably from country to country, within the same country and from one type of sex worker to another; and the pattern

of transmission of HIV-1 infection among them is related to the general patterns of HIV-1 transmission in the particular geographic region [14].

In North America, most cases of HIV-1 infection among female prostitutes are associated with injecting drug use (IDU). In 1987, among 1396 CSWs (50 % of whom were injecting drug users), 20% of the drug users and only 5% of the non-drug users were HIV-1 positive [14,31]. Again in 1987, a study of large group of CSWs in Nevada found no cases of HIV-1 infection among 535 women not injecting drugs, while 6% of the 370 women who injected drugs were infected [32].

In Europe, the situation is similar to that of North America in which IDU has been the major risk factor for HIV-1infection among sex workers. Sero-prevalence rates are much higher among IDU women compared to those who are non-IDU (40% versus 1% in Paris and 36% versus 2% in four Italian cities in 1988 [14,33]. A multi- European survey of 866 sex workers from 9 European centers carried out in 1990-91 found 32% sero-prevalence in IDU compared to 2% in non-IDU women [34].

In Africa, the Carribbian and South–East Asia, where heterosexual transmission accounts for 70-80% of HIV-1 infections, high prevalence of STD are considered to be the major contributing factor [14,23, 24, 26, 35, 36, 37, 38]. Many studies have reported that in most of these countries more than a third of female sex workers are infected with HIV-1[4,14]. HIV-1 prevalence among female sex workers of 88% (29/33) in Kigali, Rwanda [42, 43] , and 61% (32/39)in Nairobi[44] again 78% in a large sample of 525 in Nairobi, Kenya, in 1991 [14] were among the earliest data reported in Africa on the epidemic of HIV-1 infection. In subsequent years, reports of several studies from different cities of the Sub-Saharan countries have also

demonstrated high prevalence of HIV-1 infection in the high-frequency transmitter core groups, basically CSWs [28].

As with the African studies, the predominant mode of transmission among Thais prostitute population in South East Asia appears to be heterosexual contact. In Thailand's second largest city, Chiangmai the HIV-1 sero-prevalence was 36.5% among 238 women who worked in houses of prostitution in 1991[40], and HIV-1 sero-prevalence rate of more than 50% have been reported in many brothels in Northern Thailand [14]. A study conducted among 230 lower class CSW in 1992 showed a sero-prevalence of 65% [41].

Having a large number of sexual partners has been reported to be one of the major risk factors for acquiring HIV-1 infection in the presence of facilitating factors (e. g STD). A study in Florida [45], and in Nairobi [44] found that a greater number of sexual partners was a risk factor. Sexually transmitted diseases (STD) as mentioned earlier are among the potential facilitators of heterosexual transmission of HIV-1 infection. People who are HIV-1 positive often give history of at least one form of STD [46,47]. Populations in sub- Saharan Africa bear a heavy burden of STD. The WHO has estimated that a total of 333 million cases of curable STD occurred in the world during 1995. Nearly 1/5 of those, or 65 million cases are estimated to have occurred in sub- Saharan Africa [4]. This high incidence of STD in SSA is a reflection of behavior risk, which is clearly related to a high rate of sexual partner change, which on the other hand plays a major role in the HIV/AIDS epidemics [43,48,49].The wide spread prevalence of STD particularly genital ulcer diseases (GUD), like chancroid, is thought to be one of the factors accounting for the increased frequency of HIV transmission within a number of African countries [50] Non-ulcerative STD, such as gonorrhoea, chlamydia infection and trichomoniasis also enhance the risk of sexual transmission of HIV-1 infection by increasing both the

infectiousness of an HIV- 1 infected individual and the susceptibility of an infected sexual partner to HIV-1. In a prospective study among female prostitutes in Kinshasa, gonorrhoea, chlamydia infection and trichomoniasis during the presumed period of infection were all significantly associated with HIV-1 sero conversion even after controlling for sexual exposure in terms of the number of condom use [23].

In a study of low socio-economic class prostitutes in Nairobi, 50% of the women had laboratory evidence of gonococcal cervicites,28 % had genital ulcers and 32% had serologic evidence of syphilis [51]. Similarly 75% of 1233 prostitutes studied in 1991 in Kinshasa, Zaire, presented with at least one STD, 24 % had positive N. gonorhoea culture, 13% had chlamydial infections, 22% had trichomoniasis, 5% genital ulcer diseases [52].

A study conducted in Nairobi, Kenya showed women infected with genital ulcer diseases are four times more likeiy to contract HIV-1 infection during sexual intercourse with an infected partner than are women without such ulcers [53].

A study carried out in a group of female prostitutes in Zimbabwe, Harare, showed the risk of being HIV infected as being with a history of genital ulcer disease [54]. Other potential facilitators of heterosexual transmission are increased infectivity of the positive individual (partner), like during sero conversion or advanced disease when viremia is high [55], behavioral actions such as anal intercourse [56], intercourse during menses [24], bleeding during intercourse [57].

Levels of HIV-1 infection among female sex workers have been also shown to vary significantly based on SES of the women. The study on FCSW of different SES in Nigeria, Lagos, showed that 18% of 91 low class, 12% of 693 middle class, and 9% of 101 high class prostitutes were HIV-1 positive [59].

Consistent and correct use of condoms is one of the major strategies towards the prevention of HIV/AIDS in risk groups and among the general population. The protective effect of condoms against HIV infection has been demonstrated in various studies of sex workers. A study in Zaire found a clear association between seronegativity and condom use during the preceding year [52,60,61], and in Nairobi, sex workers who reported using condoms at all were three times less likely to seroconvert than those who reported not using them [62].

In contrast to the above studies on condom use much lower figures are reported from different studies in SSA and Northern Asian countries. Reports from different studies have indicated that sex workers use condoms with their private partners (paying or non- paying) less frequently than with their clients [63].

In most of the SSA countries client reluctance plays an important role in sex workers low rate of condom use. For instance In Ghana 66% of the customers of high class sex workers refused to use condoms in every sexual contact [64].

Preventive strategies targeted to such a population sub-group, like CSWs, which are labeled as high frequency HIV/STD transmitter core -groups, have brought about a remarkable reduction of the incidence of infection in some countries of Europe, SSA and South- East Asia. The major elements of such programs should include the diagnosis and treatment of STD, peer-mediated education on HIV/SD/AIDS and the promotion of condom use [65].

The European working group on HIV-1 infection in female prostitutes has provided survey data on 945 female prostitutes throughout Europe, where 80.3% of the women reported always using condoms with clients in the previous six month [66]. No seroconversion occurred among the consistent condom users compared with 10- 18% seroconversion among inconsistent condom users [67].

In Thailand, sustained prevention efforts were aimed at increasing condom use and discouraging men from visiting sex workers. As a result of these measures, HIV prevalence in 21 year old men in Northern Thailand fell from 7.1% in 1992 (when consistent condom use with CSW was < 30%) to 3.5% by 1995. The 100% condom program was one of the many efforts at reducing the sexual transmission of HIV-1 infection in Thailand [68].

A study of 500 resident prostitutes in the Pumwani area of Nairobi,Kenya provides an example of the potential impact of condom promotion, with approximately 80% seropositive prostitutes each having an average of 4 contacts per day, it was estimated that between 6000-10,000 new cases of HIV infection were prevented per year among clients and contacts of clients [69].

In Uganda due to the joint efforts of the government and NGOs the HIV prevalence in the young age group of 15-19 has considerably decreased. In some clinics the prevalence has decreased from 38% in 1991 to 7.3% in 1996.This drop has been explained by the increased condom use, and due to the trend among young people to begin sexual life in later years [6].

An increase in the regular use of condoms by clients of prostitutes from 4% to 55% over a two year period in Kinshasa led to a reduction of the annual incidence of HIV infection from 18% to 2% [70]. This was accompanied by a decrease in the incidence of other STDs as well.

In Ethiopia a sero-prevalence study conducted in 1989 among four groups of female sex workers classified based on the establishments where they work from Addis Ababa, the capital, showed 24.7% positivity,among which females from red light houses practicing MPSC were more frequently infected by HIV-1, with 44.0% positivity [13], and recent surveys of 1996-7 showed a remarkably high HIV prevalence of 65-70% [9,10].

The prevalence was also found significantly higher among those with other STD as compared to those who did not have history of STD, 40% and 21% respectively, $p < 0.0001$ [13].

Analysis done among the four groups of sex workers based on the duration of sex work showed that 18.6% of the females who had worked at least two years were positive and 45% of those who had worked 2-4 years were positive. The prevalence had decreased in those female prostitutes who had more than 5 years of exposure, i. e the prevalence of HIV-1 infection decreased with increasing duration of sex work [13].

A cohort study conducted in Nairobi, Kenya on 424 initially HIV-1 sero-negative prostitutes between 1985-1994 showed that almost 2/3 of them (239) had sero-converted in the first 2 years of follow -up. But 43 of them (10%) remained persistently sero-negative after 3 or more years being in high exposure, having about 500 unprotected exposures to HIV-1 [19].

Although analysis of epidemiological and laboratory data in the Kenyan study showed that persistent sero-negativity was not explained by differences in sexual behaviors, the present study attempted to see behavioral factors in order to identify factors associated with protection against HIV-1 infewction among CSW of Addis Ababa.

Study Objectives

General objective:

To describe socio-demographic characteristics and behaviors that might be associated with the absence of HIV-1 infection among Commercial sex workers (CSW), attending STD management services in Addis Ababa , Ethiopia.

Specific objectives:

1. To describe the socio-demographic characteristics and behaviors of CSW in Addis Ababa
2. To compare characteristics of sex workers by HIV serological status.
3. To identify a sub group of CSW who remained HIV-1 negative despite multiple exposures after at least five years of sex work.

Subjects and Methods:

This is a cross- sectional descriptive survey using a case control analysis with those CSW who are negatives as cases and HIV positives as controls. The cases and controls were determined after serological test for HIV. The study had been conducted in Addis Ababa, the capital city of Ethiopia, from August 1998 to October 1998. Addis Ababa has a population of over 2.2 million people [71] out of the total Ethiopian population of over 53 million. The study was carried out among female CSW attending STD clinics of two health centers (Arada and Tekle Haimanot). The study population was all CSW who had been coming to the health centers within the above indicated period of time.

The sampling procedure employed in this study was a purposive sampling since it was not convenient to use probability sampling techniques due to the lack of a sampling frame for the general population of CSW in Addis Ababa at the time of the study.

The sample size was determined based on the hypothesis that with a minimum sample size of 400 one would be able to detect any significant association between an exposure of interest (e. g genital ulcer), and HIV serological status (e. g., being HIV positive) provided that:

- the anticipated odds-ratio between exposure and HIV+ is 2 or more
- the prevalence of HIV infection among sex workers is 50%
- the prevalence of the exposure is at least 20% in HIV-negatives (and more in HIV positives)
- alpha=0.05
- power = 0.80
- the statistical test is two-sided (the formula for two proportions was used)

Variables

In order to meet the objectives of this study the following variables are used:

A. Exposure variables

There are four different groups of exposure variables(refer to the questionnaire in Annex 1 and 2)

1. Socio- demographic: Age, residence, education, religion, ethnicity, income, marital status (ever married), parity.

2. Behavioral factors and history of sex work: number of partners per day, frequency of sex, history of STD, genital ulcer, use of condoms, duration of sex work, cost of sex, instruction about safer sex, site of sex work, partners behavior, sexual route and use of contraceptive.

3. History of sex work

4. Knowledge and attitude on HIV/ AIDS.

B. Outcome variables

The different Sero- status (sero negativity and positivity)

Data collection

A structured questionnaire was prepared for the survey, first in English, then translated to Amharic, the official language in Ethiopia which practically all the study subjects speak, and finally back- translated to English to ensure its consistency and content (The English and Amharic version of the questionnaire are found in Annex-1,2). To guide the development of the questionnaire, in addition to the literature review done on the different sexual behaviors of CSWs, a small group discussion was conducted among CSWs who were not participating in the actual study. The questionnaire includes all details of the variables listed above. A coding list was prepared only in English since it was not difficult for the interviewers to understand and fill it. Names of respondents were coded and kept confidentially. The data collectors (interviewers) were given a five days continuous training on the content of the questionnaire and on the way how to conduct the interview (identical styles of probing, the time they should spend on a single study subject). Then the questionnaire was pre-tested on twelve CSWs to check for its consistency, content, its acceptability by the respondents and also to assess the ability of the interviewers on the proper completion of them, and adjusted before being used with the target sample.

The interviewers were females to keep the gender match. From each health center, a group of three people were involved : in the screening of CSWs at the OPD, data collection and blood sample drawing. Information was obtained from confidential face to face interviews which lasted 30-40 minutes and which were anonymous and conducted in private rooms at each enrollment site. The interviewers were supervised daily by the principal investigator throughout the data collection period, checking the coding lists for its completeness and any

omission and the proper labeling of the samples. Names of respondents were coded after the interviews and kept confidentially at the respective health centers.

Site selection

The two health centers, Teklehaimanot and Arada, were selected for the study. The health centers provide STD treatment integrated with the other health services. The selection of the health centers was based on the following reasons:

1. The areas where the health centers are located are densely populated with CSWs.
2. They are the known and oldest health centers in Ethiopia where people used to come especially for STD treatment.
3. They are project areas for the different HIV/AIDS related activities by ENARP

Subject selection

All CSWs visiting the health centers from August to October 1998 and willing to participate in the study were recruited after being seen by the physician. Then the physician sent the CSW to interviewers. The nurse introduced the objectives of the study and asked the CSW if she would be willing to participate. Each respondent was assured that the information provided would be confidential. After informed consent was obtained participants answered the questionnaire prepared on the socio-demographic characteristics, risk behaviors and history of sex work, past medical history, knowledge and attitude on HIV/AIDS (A copy of the Amharic and English version of the consent forms is found in Annex-3,4). The questionnaire was labeled by code numbers only (Code numbers are found in Annex-5). A nominal reimbursement was paid to the medical personnel (physicians, nurses, laboratory technicians)

for their participation in the study. The subjects were also compensated for their participation and transportation to the counseling center. A total of 312 CSWs were enrolled and interviewed during the study period.

Laboratory methods

From each study participant 2 tubes of 10 ml each blood was collected using vacutainer tubes at the health centers and transported to ENARP laboratory daily. Tubes were identified by code number only corresponding to the one on the questionnaire. At the ENARP laboratory plasma and cells were isolated and frozen. HIV and syphilis serology were performed on plasma. The HIV test was performed using HIVSPOT Test Kit (Genelabs, Singapore) and ELISA (Organon Murex HIV 1+2 UK, Vironostika HIV Uni-Form II, France). All initially antibody reactive samples by ELISA were analyzed by a second ELISA (Wellcozyme) test for confirmation. If the results were indeterminate they were confirmed by Western Blot(HIV-BLOT 2.2 , Genelabs, Singapore) test.

For syphilis serology test Passive Particle Agglutination Test for the detection of Trepanoma Pallidium Antibodies (TPPA, Fujirebio, Japan) and Rapid Plasma Reagin (RPR , Bio Merieux) were used on the same sample. All TPPA reactive samples were confirmed by RPR. Samples reactive only by TPPA were considered as treated and cured syphilis Samples reactive by both TPPA and RPR were interpreted as recent and active syphilis. Syphilis results were returned within two weeks to the health centers matched the syphilis results to the participants' names using their registry. Treatment for patients diagnosed with syphilis was given based on the protocol of management of the health centers. A data set was created which contained the code number of each participant, the questionnaire results and the

laboratory results. No name or individual address was included in the data set so that it was not possible to link any laboratory results with individuals.

All individuals participating in the study were informed that blood would be used in part for HIV testing and related research. However HIV results were not returned to the health centers, as there are no counseling services available. For the participants willing to know their HIV test results, they were offered the opportunity to communicate with one of the Region 14 (Addis Ababa) counseling centers (Ras Desta hospital). (The communication with the counseling center is shown in Annex- 6).

Participants of the study were offered a fee of 15 Ethiopian birr during their enrollment period to cover their transportation costs and their time lost.

Data entry and analysis

After assessing the completeness, accuracy and consistency of the data, the information was entered into a computer. This was done using Access and STATA statistical software program. Identification of risk factors for HIV-1 infection among CSW was performed using univariate and multivariate analysis (logistic regression model). Proportions and means were compared using chi-square and *t*-test when appropriate.

Ethical consideration

The research was approved by the National Ethical Clearance Committee and the medical faculty of Addis Ababa. Informed consent was obtained from each participant. Interviews were done in private rooms and were gender matched. Confidentiality was strict throughout the data collection and analysis. Pre-test and post- test counseling was given to those who wanted to know the results of their test.

RESULTS

1. Socio-demographic characteristics of the study participants

From August to October 1998, a total of 312 CSWs who were attending two health centers in Addis Ababa, Ethiopia, were enrolled in the study. Their reasons for attending health centers were primarily STD management (78.5%). Their socio-demographic characteristics are summarized in Table 1. The mean age of the respondents was 25 years, and 36% of them were in the age group 20-24 years. Most of the respondents had little education (78.6% were less than grade 6). Only 54/312 (17%) of the study participants were born in Addis Ababa. The majority of them were from the northern part of the country, 71% of them identifying themselves with the amhara ethnic group. Of those who were not born in Addis Ababa, the mean and median age at arrival in Addis Ababa was 15 years. Fifty one percent of the study participants had been married at some point in their life, and 54.4% had at least one child. Seventy-seven percent of the study population had an average daily income of less than 10 Ethiopian birr (1 US$= 7.25 Ethiopian Birr).

2. History of sex work

The sex work history of study participants is summarized in Table 2. Of the 258 women who were not born in Addis Ababa, 249 (96.5%) started being sex workers only after coming to the capital city. These women became sex workers after staying a mean number of years of 5.3 years in Addis Ababa (median = 3 years). Half (49.7%) of the respondents had been working as housemaids before they started to work as sex worker. Mean age at the beginning of sex work was 19.5 years (range = 11-35). Their mean duration of sex work was 5.5 years (range,

0-26), including 4.3 years in the current site. Two thirds of them have received some kind of instruction before or while working as sex worker. Their main "instructors" were their friends (49.5%), followed by peers (33.1%). Topics covered during instruction were how to handle clients (17.0%), use of condoms (14.1%), risk of STD (11.0%) and HIV (7.4%), contraception (9.6%), and diagnosis and treatment of STDs (7.7%). The most common site of work was individually owned rooms (40.4%), followed by shared rooms (30.8%), streets (18.7%), bars (13.8%), and others (tella bets, red light houses, and hotels). For the 280 (89.7%) sex workers who worked at day time, the mean charge per client was ETB 6.1 (range 1-30). For those working at night time, the mean charge per client was ETB 16.9 (range 1-50). The mean number of clients per sex worker per day during the past year was 2.33, and for the last working day 2.09.

3. Knowledge and attitude on HIV/AIDS

The knowledge of sex workers on HIV/AIDS was high, and most (96.8%) were afraid of AIDS. Although the majority (87.2%) of them would say that one can protect oneself against HIV infection, and that condoms were one effective mean of prevention (86.5%), two third of them said that they thought they were infected with HIV. One widespread (49.7%) misconception was the belief that people looking healthy could not be infected with HIV. Less than 10% of sex workers thought that some people could be resistant to HIV, and that there was a cure for AIDS. However, with the changes in the current knowledge in HIV/AIDS, these answers might actually be considered as correct rather than false. Finally, only 39.1% of sex workers reported knowing someone with AIDS, a surprisingly low finding in a community so much affected by HIV/AIDS.

4. Sexual behaviours

Almost all (98.7%) sex workers have used condoms at least once in their life, and almost all of them (98.1%) said that condoms were easy to find. Forty-three percent of them reported using condoms in more than 95% of sexual acts with clients. However, 18.9% of them acknowledged using condoms rarely, i.e., in less than 30% of sexual acts with clients. When asked about condom use with the last client, 77.2% of the sex workers said having used a condom. Circumstances in which condoms are not used were client refusal (70.2% of the sex workers said yes), client becoming physically aggressive (43.6%), willingness to satisfy clients (38.5%), higher payment (30.1%), and being forced by the establishment owner (8.0%).

Most (92.3%) of sex workers also reported having criteria for selecting or rejecting clients. Among these criteria were the cleanness of the client (86.2%), the healthy look of a client (80.3%), the appearance of the genitals (67.8%), the appearance of the client's skin (63.0%), the wealth of the client (28.6%), and the thinness of the client (27.6%).

Sex workers had different cleansing practices following sex: most of them (58.3%) would use water only, some (36.8%) water and soap, and few (3.2%) other products. One third of sex workers would always have sex during menses, one third would never have sex during menses, and one third would occasionally have sex during menses. Few (15%) sex workers complained about bleeding after sex.

The preferred mode of contraception was the pill (53.2%) of women, followed by condoms (35.9%), and injectable hormones (16.9%). Thirty-five percent of the sex workers were not using any contraception at all.

Genital symptoms were common among sex workers: 76.6% complained about at least one episode of genital discharge in the past year requiring treatment (mean: 3.21), and 43.3% of a genital ulcer (mean: 2.18).

5. *HIV prevalence and related factors*

HIV prevalence was extremely high among sex workers of Addis Ababa: 249/310 (80.3%; 95% CI= 75.4%-84.6%; two test results were not available at the time of the data analysis). HIV prevalence was higher in sex workers attending Tekle-Haymanot Health Centre (87.9%), when compared to sex workers attending Arada Health Centre (70.6%) ($p<0.001$). Syphilis prevalence was also extremely high in this population: 57.8% (95% CI=52.2-63.4%), and was increasing with age ($p<0.01$; test for trend). The associations between HIV infection and socio-demographic characteristics, history of sex work, knowledge and attitude towards HIV/AIDS, and sexual behaviours are available in Tables 1 to 4.

The peak HIV prevalence was observed in the age group 25-29 years (89.1%). Among all socio-demographic characteristics recorded, the one with the most consistent association with HIV serological status was the educational level of the study participant. There was a 29% and 25% decrease in odds of HIV infection per increase of one category of educational level in univariate and multivariate analysis, respectively.

The association between duration of sex work and HIV serological status was complex. The peak HIV prevalence was among sex workers with four to seven years of sex work (86.8%), although not statistically different from HIV prevalence figures observed in women with more, or less, duration of sex work. Instructions regarding sex work tend to be beneficial against

HIV infection to sex workers, particularly when given by peers (OR= 0.47, 95% CI= 0.23-0.96 in multivariate analysis). One of the most striking finding of this study was the strong association between HIV infection and using as a work site a room shared with other sex workers (OR= 3.33, 95%CI= 130-8.51 in multivariate analysis). Although there was a protective effect against HIV infection associated with having lower number of clients (OR= 0.38 for one client per day when compared to more than two), and charging more money per client (OR=0.39 for charging more than 20 birr per client when compared to less than ten birr), these associations did not remain in multivariate analysis.

Few knowledge and attitude factors were associated with HIV infection. Only the belief of being HIV-infected was associated with a marginally significant protection against HIV infection (OR= 0.48, 95% CI= 0.22-1.03) in multivariate analysis. Knowing someone with HIV/AIDS was also associated with protection against HIV infection. However, this latter association disappeared after control for other variables.

Several indicators of condom use were associated with protection against HIV infection in univariate analysis: the odds of HIV infection decreased by 29% with an increase of one category of frequency of condom use with clients; having used a condom with the last client was associated with a 58% decrease of the odds of being HIV-infected; and finally, using condoms for contraception was associated with a 69% decrease in the odds of being HIV-infected. Also, women who acknowledged that they would eventually have sex without condoms with clients refusing to use condoms were more likely to be HIV-infected (OR= 2.53, 95% CI= 1.37-4.68). However, all these associations were no longer significant in multivariate

analysis, suggesting that they were mediated through other factors such as educational background and peer instruction.

Interestingly, women who were using criteria to select their clients were more likely to be HIV-infected. This association, not present in univariate analysis, became significant only after controlling for all variables present in the multivariate model. However, there was not a unique variable which could be identified as "the" counfounding variable masking the association between client selection criteria and HIV status.

Of importance, cleansing with a soap after sex was associated with a decrease of 51% of the odds of HIV infection in multivariate analysis. Bleeding after sex was associated with an increase in the odds of HIV infection (odds per increase of one category of frequency of bleeding after sex =2.34, 95% CI= 1.01-5.41). Finally, a recent (less than one year) history of genital ulcer was associated with an increase of the odds of being HIV-infected (OR= 2.89, 95% CI= 1.39-5.99). This was corroborated with the expected association between HIV and syphilis serological status (OR= 3.56, 95% CI= 1,66-7,63).

The factors independently associated with HIV infection in multivariate analysis are available in Table 5. Although being recruited at Tekle-Haymanot Health Centre, as opposed to Arada Health Centre, was strongly associated with HIV infection in univariate analysis (OR= 3.04; $p<0.001$), the association disappeared after inclusion of the variables contained in the best multivariate model (OR= 1.02, $p=0.97$).

6. *Characterization of HIV-negative women with more than five years of sex work.*

One hundred seventeen women had five years or more of sex work. Of these, 25 (21%) were still HIV-negative. Were these women "biologically" resistant, behavioural factors should not play an important role among the determinants of their HIV serological status. However, when restricting the analysis to the 117 women with five years or more of sex work, the direction and magnitude of the associations shown in Table 5 were identical if not increased. Only because of smaller sample size (n=117 instead of 312) are the associations no longer statistically significant, except for cleansing with soap after sex (see Table 6).

However, there was a small sub-group of HIV-negative sex workers with five years of sex work who did not share the characteristics identified as "protective" against HIV infection in our model. These women may indeed be protected by factors others than behavioural, i.e. biological. Their peripheral blood mononuclear cells have been isolated and frozen for further laboratory analysis on immunological and genetic factors which might be associated with resistance against HIV infection. In particular, there were seven women who had at least four known risk factors against HIV infection, and were still HIV-negative. The laboratory analyses should therefore focus on these women.

Table 1. Relationship of socio-demographic characteristics of the female sex workers and HIV serological status in Addis Ababa, 1998

Variable	n (%)	% HIV-1 +	Age-adjusted OR (95% CI) Univariate	OR (95% CI) Multivariate[1]
Age				
15-19 years	54 (17.3)	77.9	1.0	1.0
20-24 years	112 (35.9)	83.9	1.49 (0.65-3.37)	1.69 (0.68-4.21)
25-29 years	66 (21.2)	89.1	2.32 (0.84-6.4)	3.24 (1.06-9.95)*
30-34 years	35 (11.2)	71. 4	0.71 (0.26-1.89)	1.31 (0.42-4.12)
35+	45 (14.4)	68.9	0.62 (0.26-1.56)	1.09 (0.39-3.09)
Education:				
No schooling	110 (35.3)	87.9		
Literacy campaign	25 (8.0)	80.0		
Grade 1-6	109 (34.9)	77.1	0.71 (0.57-0.89)[2]*	0.75 (0.58-0.96)*
G rade 7-8	41 (13.1)	75.6		
Grade 9+	26 (8.3)	69.2		
Missing data	1 (0.3)			
Ethnicity				
Amhara	220 (70.5)	77.6	1.0	1.0
Oromo	51 (16.3)	88.0	1.98 (0.79-4.97)	1.78 (0.64-4.94)
Gurage	31 (9.9)	87.1	1.91 (0.62-5.85)	1.32 (0.38-4.59)
Others	10 (3.2)	80.0	1.19 (0.23-6.01)	0.49 (0.09-2.84)
Religion Christan Orthodox				
No	16 (5.1)	93.3	1.0	1.0
Yes	296 (94.9)	79.7	0.29 (0.04-2.36)	0.12 (0.01-1.22)
Marital status				
Never married	154 (49.4)	83.6	1.0	1.0
Married &:				
involuntary separation	57 (18.3)	78.9	0.67 (0.29-1.49)	0.35 (0.13-0.92)*
divorced	44 (14.1)	68.2	0.47 (0.20-1.11)	0.42 (0.15-1.13)
ran away	35 (11.2)	86.8	1.36 (0.47-3.98)	0.95 (0.29-3.19)
widowed	22 (7.1)	76.2	0.66 (0.19-2.21)	0.69 (0.18-2.62)
Number of children:				
No child	142 (45.5)	83.1	1.0	1.0
one child	92 (29.5)	80.2	0.76 (0.37-1.57)	0.67 (0.29-1.52)
>1child	77 (24.7)	75.0	0.81 (0.33-2.00)	0.82 (0.29-2.27)
Missing data	1 (0.3)			

Duration of residence in Addis Ababa				
0-5 years	90 (28.8)	84.4	1.0	1.0
6-12 years	80 (25.6)	91.1	1.81 (0.67-4.90)	2.22 (0.75-6.61)
13-20 years	74 (23.7)	69.9	0.46 (0.20-1.03)	1.09 (0.42-2.85)
21-40 years	68 (21.8)	73.5	0.58 (0.23-1.50)	1.21 (0.39-3.77)
Average daily income (Eth birr)				
0-4	50 (16.0)	77.6	1.0	1.0
5-9	84 (26.9)	80.9	0.99 (0.40-2.47)	0.79 (0.29-2.19)
10	101 (32.4)	84.0	1.09 (0.43-2.81)	0.89 (0.30-2.64)
>10	69 (22.1)	79.7	0.85 (0.31-2.32)	0.70 (0.21-2.35)
Did not know	8 (2.6)			
Occupation before becoming a sex worker				
No occupation	47 (15.1)	73.9	1.0	1.0
Student	48 (15.4)	75.0	0.89 (0.34-2.33)	1.41 (0.44-4.52)
House wife	44 (14.1)	72.1	0.92 (0.35-2.44)	0.69 (0.24-1.99)
House maid	155 (49.7)	85.2	2.20 (0.96-5.02)	1.51 (0.60-3.78)
Other job	18 (5.8)	88.2	2.91 (0.55-15.43)	1.68 (0.28-10.0)

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* $p<0.05$

[1] The multivariate model includes all variables with significant associations with HIV infection (as listed in Table 5), plus the variable under study

[2] odds of HIV infection associated with an increase of one category of education

Table 2. Relationship of history of sex work and HIV serological status in Addis Ababa, 1998.

Variable	n (%)	%HIV+	Age-adjusted OR (95% CI) Univariate	OR (95% CI) Multivariate[1]
Age at first sex:				
6-14 years	115 (36.9)	80.6	1.0	1.0
15 years	62 (19.9)	74.2	0.68 (0.32-1.43)	0.84 (0.36-1.94)
16-17 years	63 (20.2)	79.4	0.81 (0.63-1.81)	1.29 (0.50-3.31)
>17 years	46 (14.7)	86.7	1.23 (0.45-3.39)	1.45 (0.46-4.57)
Did not know	26 (8.3)			
First sexual intercourse as a CSW				
No	298 (95.5)	80.1	1.0	1.0
Yes	14 (4.5)	85.7	1.54 (0.33-7.24)	1.04 (0.19-5.69)
Duration of work as a CSW (in years)				
<3	91 (29.2)	83.5	1.0	1.0
3	71 (22.8)	75.7	0.58 (0.26-1.29)	0.46 (0.19-1.15)
4-7	84 (26.9)	86.8	1.39 (0.57-3.46)	1.65 (0.61-4.48)
>7	65 (20.8)	72.3	0.81 (0.29-2.27)	1.29 (0.38-4.03)
Did not know	1 (0.3)			
Instruction while working as a CSW				
No	97 (31.1)	83.3	1.0	1.0
Yes	210 (67.3)	79.4	0.67 (0.35-1.29)	0.79 (0.35-1.79)
Missing data	5 (1.6)			
Instruction by whom?				
No instruction	97 (31.1)	82.4	1.0	1.0
Peers	71 (22.8)	66.2	0.41 (0.19-0.86)*	0.47 (0.23-0.96)*
Bar owners	11 (3.5)	81.8	0.98 (0.18-5.22)	1.14 (0.18-7.06)
Relatives	6 (1.9)	83.3	1.38 (0.15-12.98)	1.27 (0.12-12.9)
Friends	106 (34.0)	86.7	1.12 (0.49-2.51)	0.78 (0.32-1.89)
Others	20 (6.4)	85.0	0.82 (0.21-3.26)	0.42 (0.09-1.92)
Missing data	1 (0.3)			
Instruction on what ?				
Risk of HIV				
No	285 (91.3)	80.9	1.0	1.0
Yes	23 (7.4)	69.6	0.41 (0.16-1.09)	0.89 (0.28-2.76)
Missing data	4 (1.3)			
Risk of STD				
No	275 (88.1)	82.1	1.0	1.0
Yes	34 (11.0)	67.7	0.49 (0.22-1.11)	0.80 (0.32-2.02)
Missing data	3 (0.9)			
Condom use				
No	266 (85.3)	81.9	1.0	1.0
Yes	44 (14.1)	69.8	0.39 (0.18-0.84)*	0.55 (0.23-1.33)
Missing data	2 (0.6)			

Client handling				
No	257 (82.4)	81.3	1.0	1.0
Yes	53 (17.0)	75.0	0.69 (0.34-1.41)	0.81 (0.35-1.91)
Missing data	2 (0.6)			
Diagnosis and treatment of STD				
No	285 (91.3)	81.6	1.0	1.0
Yes	24 (7.7)	66.7	0.48 (0.19-1.22)	0.97 (0.33-2.82)
Missing data	3 (1.0)			
Contraception				
No	272 (87.2)	81.6	1.0	1.0
Yes	30 (9.6)	66.8	0.39 (0.17-0.93)*	0.97 (0.35-2.71)
Missing data	10 (3.2)			
Current site of work[2]				
Streets				
No	253 (81.4)	80.1	1.0	1. 0
Yes	58 (18.7)	81.0	0.93 (0.44-1.99)	0.79 (0.32-1.95)
Missing data	1 (0.3)			
Bars				
No	266 (85.3)	81.1	1.0	1.0
Yes	43 (13.8)	74.4	0.59 (0.27-1.29)	0.89 (0.35-2.25)
Missing data	3 (1.0)			
Individual owned room				
No	185 (59.3)	84.8	1.0	1.0
Yes	126 (40.4)	73.6	0.56 (0.29-1.09)	1.05 (0.46-2.42)
Missing data	1 (0.3)			
Shared room				
No	205 (65.7)	74.8	1.0	1.0
Yes	96 (30.8)	91.6	3.37 (1.54-7.40)*	3.33 (1.30-8.51)*
Missing data	1 (0.3)			
Others[3]				
No	288 (92.3)	79.4	1.0	1.0
Yes	22 (7.1)	90.9	2.55 (0.57-11.33)	2.98 (0.62-14.4)
Missing data	2 (0.6)			
Charge per client during the day time (Eth birr)				
<4	126 (40.4)	83.9	1.0	1.0
5	85 (27.2)	82.4	0.81 (0.38-1.74)	0.94 (0.41-2.14)
>5	69 (22.1)	68.1	0.34 (0.16-0.71)*	0.52 (0.25-1.30)
Did not work at day time	32 (10.3)			

Charge per client during the night time (Eth birr)				
<10	117 (37.5)	84.5	1.0	1.0
11-15	86 (27.6)	83.5	0.63 (0.27-1.45)	0.55 (0.22-1.36)
16-20	52 (16.7)	71.2	0.36 (0.15-0.83)*	0.56 (0.21-1.48)
>20	51 (16.3)	74.5	0.39 (0.16-0.94)*	0.95 (0.31-2.93)
Missing data	6 (1.9)			
Number of clients per day/average				
1	150 (48.1)	75.1	1.0	1.0
2	49 (15.7)	79.6	1.08 (0.47-2.52)	0.35 (0.12-1.04)
>2	89 (28.5)	89.8	2.61 (1.13-6.04)*	0.75 (0.25-2.25)
Did not know	24 (7.7)			
Fidelity of clients/same clients coming back				
None (0%)	13 (4.2)	69.2	1.0	1.0
Few (1-29%)	92 (29.5)	89.1	3.31 (0.83-13.24)	3.64 (0.81-16.4)
Some (30-59%)	99 (31.7)	75.3	1.36 (0.34-5.02)	2.68 (0.61-11.8)
Most (60-99%)	91 (29.2)	80.2	1.78 (0.47-6.69)	4.44 (0.98-20.2)
All (100%)	17 (5.4)	70.6	1.33 (0.26-6.95)	2.34 (0.36-15.3)

* $p<0.05$

[1] The multivariate model includes all variables with significant associations with HIV infection (as listed in Table 5), plus the variable under study

[2] Some women indicated two work sites

[3] others include hotels, tella and arake houses, and "red light" houses

Table 3. Relationship of knowledge on HIV/AIDS and HIV serological status of the sex workers, Addis Ababa, 1998

Variable	n (%)	%HIV+	Age-adjusted OR (95% CI) Univariate	OR (95% CI) Multivariate[1]
Do you think someone looking healthy can be HIV infected ?				
No	155 (49.7)	85.1	1.0	1.0
Yes	157 (50.3)	75.6	0.56 (0.31-1.01)	0.78 (0.40-1.51)
Do you think that people can be resistant to HIV infection ?				
No	283 (90.7)	79.4	1.0	1.0
Yes	27 (8.7)	88.9	1.99 (0.57-6.95)	1.56 (0.38-6.45)
Did not know	2 (0.6)			
Do you think it is possible to prevent oneself from HIV/ AIDS?				
No	32 (10.3)	83.9	1.0	1.0
Yes	272 (87.2)	80.1	0.84 (0.30-2.33)	0.89 (0.26-3.06)
Did not know	8 (2.6)			
Do you think condoms can protect against HIV/AIDS?				
No	15 (4.8)	86.7	1.0	1.0
Yes	270 (86.5)	80.2	0.51 (0.11-2.39)	0.44 (0.08-2.35)
Did not know	27 (8.7)			
Do you think good medical service helps improving the course of HIV infection?				
No	212 (67.9)	80.1	1.0	1.0
Yes	94 (30.1)	80.7	0.94 (0.49-1.78)	1.01 (0.49-2.07)
Did not know	6 (1.9)			
Do you think there is a cure for AIDS?				
No	275 (88.1)	79.8	1.0	1.0
Yes	27 (8.7)	77.8	0.82 (0.31-2.17)	0.69 (0.24-2.01)
Did not know	10 (3.2)			
Do you know someone with AIDS?				
No	189 (60.6)	86.1	1.0	1.0
Yes	122 (39.1)	71.3	0.49 (0.26-0.93)*	0.89 (0.42-1.88)
Missing data	1 (0.3)			
Are you afraid of AIDS?				
No	8 (2.6)	87.5	1.0	1.0
Yes	302 (96.8)	80.0	0.57 (0.67-4.89)	0.68 (0.07-6.65)
Could not tell	2 (0.6)			
Do you think you are at risk of HIV?				
No	39 (12.5)	84.2	1.0	1.0
Yes	243 (77.9)	77.7	0.65 (0.25-1.67)	0.96 (0.34-2.69)
Difficult to tell	30 (9.6)			

Do think that you are HIV-infected?				
No	87 (27.9)	83.7	1.0	1.0
Yes	202 (64.7)	77.6	0.68 (0.35-1.34)	0.48 (0.22-1.03)
Did not know	23 (7.4)			
Are you interested to know the result of the HIV test?				
No	5 (1.6)	60.0	1.0	1.0
Yes	306 (98.1)	80.9	3.39 (0.53-21.5)	2.49 (0.27-22.7)
Indifferent	1 (0.3)			

* $p<0.05$

[1] The multivariate model includes all variables with significant associations with HIV infection (as listed in Table 5), plus the variable under study

Table 4. Relationship of selected sexual behaviours/sexual practices and HIV serological status of the sex workers in Addis Ababa, 1998

Variable	n (%)	%HIV+	Age-adjusted OR (95% CI) Univariate	OR (95% CI) Multivariate[1]
Condom use (ever)				
No	3 (1.0)	66.7	1.0	1.0
Yes	308 (98.7)	80.7	1.21 (0.10-14.19)	1.60 (0.11-23.8)
Missing data	1 (0.3)			
Duration of condom use (in years)				
<2	162 (51.9)	79.5	1.0	1.0
3-4 years	75 (24.0)	82.4	1.36 (0.64-2.85)	1.77 (0.77-4.05)
20 years	53 (17.0)	79.3	1.36 (0.59-3.12)	1.44 (0.56-3.71)
Did not know	22 (7.1)			
Has easy access to condoms				
No	3 (1.0)	100.0		
Yes	306 (98.1)	80.1	...	...
Missing data	3 (1.0)			
Reasons for occasionally not using condoms:				
Client refusal				
No	92 (29.5)	68.1	1.0	1.0
Yes	219 (70.2)	85.3	2.53 (1.37-4.68)*	1.26 (0.60-2.62)
Missing data	1 (0.3)			
To satisfy clients				
No	192 (61.5)	78.5	1.0	1.0
Yes	120 (38.5)	83.2	1.17 (0.63-2.16)	0.83 (0.41-1.69)
Higher payment				
No	217 (69.6)	78.1	1.0	1.0
Yes	94 (30.1)	85.1	1.49 (0.76-2.92)	0.92 (0.41-2.04)
Missing data	1 (0.3)			
Client brutality				
No	176 (56.4)	78.3	1.0	1.0
Yes	136 (43.6)	82.9	1.14 (0.59-2.20)	0.60 (0.28-1.31)
Forced by establishment owners				
No	287 (92.0)	79.6	1.0	1.0
Yes	25 (8.0)	88.0	1.76 (0.50-6.2)	0.81 (0.18-3.53)
Other reasons[2]				
No	223 (71.5)	82.9	1.0	1.0
Yes	87 (27.9)	73.3	0.65 (0.35-1.21)	1.24 (0.59-2.61)
Missing data	2 (0.6)			

Frequency of condom use with clients				
Never (0%)	5 (1.6)	80.0		
Rarely (1-29%)	54 (17.3)	87.0	0.71 (0.54-0.92)[3] *	0.91 (0.68-1.23)[3]
Occasionally (30-59%)	38 (12.2)	100.0		
Often (60-94%)	79 (25.3)	79.5		
Almost always (95-99%)	116 (37.2)	72.2		
Always (100%)	17 (5.4)	82.4		
Missing data	3 (1.0)			
Condom use with last client				
No	67 (21.5)	89.6	1.0	1.0
Yes	241 (77.2)	77.8	0.42 (0.18-0.98)*	0.59 (0.21-1.51)
Missing data	4 (1.3)			
Has criteria for client selection				
No	23 (7.4)	78.3	1.0	1.0
Yes	288 (92.3)	80.4	1.18 (0.41-3.39)	3.65 (1.06-12.6)*
Missing data	1(0.3)			
Post-coitus cleansing with water only				
No	128 (41.0)	75.6	1.0	1.0
Yes	182 (58.3)	83.4	1.44 (0.80-2.58)	0.78 (0.39-1.54)
Missing data	2(0.6)			
Cleansing with soap				
No	195 (62.5)	84.5	1.0	1.0
Yes	115 (36.9)	72.8	0.54 (0.30-0.97)*	0.49 (0.25-0.94)*
Missing data	2 (0.6)			
Bleeding after sex				
Never (0%)	266 (85.5)	78.8		
Rarely (1-29%)	26 (8.3)	80.8		
Occasionally (30-59%)	15 (4.8)	100.0	2.12 (0.98-4.58)[4]	2.34 (1.01-5.41)[4]*
Often (60-94%)	5 (1.6)	100.0		
Almost always (95-99%)	0			
Always(100%)	0			
Medication for genital discharge in the past year				
No	72 (23.1)	80.6	1.0	1. 0
Yes	239 (76.6)	80.2	0.96 (0.48-1.89)	0.85 (0.39-1.85)
Missing data	1 (0.3)			
Medication for genital ulcer in the past year				
No	174 (55.8)	72.0	1.0	1.0
Yes	135 (43.3)	90.4	3.59 (1.83-7.04)*	2.89 (1.39-5.99)*
Missing data	3 (1.0)			
Ever used contraceptives in the past year				
No	79 (25.3)	86.1	1.0	1.0
Yes	232 (74.4)	78.3	0.55 (0.26-1.14)	0.79 (0.35-1.78)
Missing data	1 (0.3)			

Current contraceptive use				
No contraception	110 (35.3)	87.3	1.0	1.0
Oral pills	73 (53.2)	77.5	0.46 (0.20-1.02)	0.72 (0.29-1.81)
Injectable hormones	48 (16.9)	91.7	1.33 (0.40-4.35)	0.76 (0.21-2.69)
Condoms	69 (35.9)	68.1	0.31 (0.14-0.68)*	0.63 (0.26-1.52)
Others[5]	12 (5.3)	75.0	0.21 (0.06-0.79)*	0.37 (0.82-1.64)

* $p < 0.05$

[1] The multivariate model includes all variables with significant associations with HIV infection (as listed in Table 5), plus the variable under study

[2] others include

[3]odds of infection for an increase of one category of bleeding after sex

[4]odds of HIV infection for an increase of one category of frequency of condom use

[5] others include IUD, norplant

Table 5. Multivariate analysis of factors associated with HIV infection among sex workers, Addis Ababa, 1998

	OR	95% CI
Age (in years)		
15-19	1.0	
20-24	1.69	0.68-4.21
25-29	3.24	1.06-9.95
30-34	1.31	0.42-4.12
35+	1.09	0.39-3.09
No education	2.27	1.05-4.95
Instruction by peers	0.47	0.23-0.96
Shared room	3.33	1.30-8.51
Selection criteria for clients	4.20	1.14-15.4
Genital bleeding after sex[1]	2.34	1.01-5.41
Cleaning with soap after sex	0.49	0.25-0.94
Medication for genital ulcer in the past year	2.89	1.39-5.99
Positive syphilis serology (TPPA)	3.56	1.66-7.63

[1] OR associated with an increase of one category of genital bleeding

Table 6. Univariate and Multivariate analysis of factors associated with HIV infection among sex workers with five years or more of sex work (n=117), Addis Ababa, 1998

	Univariate		multivariate	
	OR	95% CI	OR	95% CI
Age[1]	0.90	0.84-0.97	0.89	0.81-0.98
No education	3.60	1.07-12.4	3.42	0.81-14.5
Instruction by peers	0.43	0.17-1.12	0.42	0.13-1.35
Selection criteria for clients	0.72	0.08-6.67	11.52	0.15-865
Genital bleeding after sex[2]	1.96	0.58-6.56	2.74	0.63-12.0
Cleaning with soap after sex	0.35	0.13-0.91	0.23	0.07-0.77
Medication for genital ulcer in the past year	6.52	1.77-24.10	4.69	1.13-19.5

[1]Age was modelled as a continuous variable here, since all women in the age group 20-24 (n=16) were HIV-infected. The OR displayed in the table correspond to the odds of HIV infection associated with an increase of one year of age.
[2] OR associated with an increase of one category of genital bleeding
All women sharing a room were HIV-infected. The variable therefore could not be used in the multivariate analysis.

Discussion

The present study has analyzed the socio-demographic characteristics, sexual behavior and other factors associated with HIV-1 infection among female sex workers. The findings indicate an overall seroprevalence of 80.3% among commercial sex workers in Addis Ababa. This indicates an alarming progression of the infection since the prevalence rate was only 18.5% in 1988, 24.7% in 1989 [13,17], and 47-59% in 1996-7 (ENARP, personal communication). Such HIV prevalence levels are, to my knowledge, undocumented elsewhere in the world in studies with sample size larger than fifty. One may speculate that this large HIV prevalence might be partially the result of the selection of the sex workers from STD clinics attenders, i.e., from women with STD symptoms and thus non-consistent condom users.

Most (83%) of the sex workers were not born in Addis Ababa. The median age of arrival in the capital city was 15 years of age. Then, the median waiting time before starting sex work was three years. The highest HIV prevalence was found in the age group 25-29 years (89.1%), consistent with the mean age at beginning of sex work of 19.5 years, a risk of becoming infected within the first two years of sex work of 66%[19], and the limited mortality experienced in the first years of HIV infection. This is also compatible with the peak HIV prevalence observed among women with four to seven years of sex work (86.8%). Other studies in Addis Ababa[13] and elsewhere have also documented a decrease in HIV prevalence in women with five to seven years of sex work, likely as a result of the HIV-related mortality among women with many years of sex work and HIV infection[41].

Among the respondents, 35.4% were illiterate and 8.4% had education level of grade 9 and above. HIV-positivity decreased with increasing educational status. Highest prevalence was observed among the illiterate (87.9%), while seropositivity was lower (69%) among those grade ninth and higher. This association was statistically significant in both univariate and multivariate models (OR= 0.75, 95% CI= 0.58 - 0.96). This might be related to the better information about safer sexual practices in those with higher education when compared to those with lower education.

The present study had also attempted to see whether the respondents ever had any instruction about safe sex practices and how to handle clients, while working as commercial sex workers. According to the result, 68.4% had got some form of instruction in the past. Among these, 14.2% got instructions on the use of condoms, 9.9% on the use of contraceptives, 7.5% on risk of HIV, and 6.5% on other protective measures. Those who responded as having had instructions on condoms and contraceptives had a lower HIV prevalence than the rest (OR = 0.39, 95% CI 0.17 - 0.93) in univariate analysis. In addition, those who got their instructions from their peers were found to have a lower seroprevalence compared to those who had no instruction at all (OR=0.41, 95% CI 0.19 - 0.86). The fact that peers can be highly effective in conveying and disseminating health related information for has also been documented elsewhere [75]. Peer mediated education programs in Kenya and Zimbabwe which focus on female sex workers have led to increase in the use of condoms and the practice of other safe sexual practices with a resultant decrease in the incidence of HIV and STDs [65]. This shows that peer groups can easily understand each other and discuss freely.

The majority of the respondents (41.7%) worked in individually owned houses and 32.5% shared rooms with others commercial sex workers. Those sharing rooms had a significantly

higher seropositivity than those who worked in individually owned rooms. Since the association remained significant in multivariate analysis, including many indirect measurement of socio-economical status (e.g., daily and monthly income) or behavioural characteristics (e.g., number of clients, condom use), the explanation might be in unmeasured correlates of living in shared rooms. These correlates might be socio-economic variables too complex to be captured in a direct questionnaire (e.g. refined educational level assessment), or variables not measured at all (e.g., HIV prevalence in clients). Socio-economic class is one known factors associated with HIV status among sex workers [59].

A study in Thailand has demonstrated a strong association between lower charge per sex and HIV infection (OR = 22.9, 95% CI = 7.6 - 91.4). The present study has also shown a decrease in seropositivity with higher charge for sexual act which was statistically significant in univariate analysis. In addition to reflecting higher social class, charging higher fees may also indicate the fact that those sex workers would have fewer sexual contacts than those charging lower fees. Having higher number of clients was also significantly associated with seropositivity (odds ratio of 2.61 with 95% CI of 1.13 - 6.04).

Consistent use of condoms is one of the most important protective measures for those sexually active. An increase in regular use of condoms from 4% to 55% over a two year period in Zaire had led to a reduction in annual incidence of HIV infection from 18% to 2% [70]. In the present study, even though 98.5% of the respondents reported as having access to condoms, only 43% were using them in more than 95% of sexual acts. One of the main reasons for not using condoms among the respondents in the present study was refusal by partners. This risk

factor also has been shown as being important in other countries. A study in Ghana showed that 66% of the customers were reluctant to use condoms [64].

The role of other sexually transmitted diseases in facilitating the transmission of HIV has been documented in many studies [23, 24, 37, 50, 52, 54]. In addition, HIV-positive women with syphilis are more likely to develop genital ulcers than HIV-negative women with syphilis. Similarly, the present study has shown a statistically significant association between HIV infection and genital ulcers (odds ratio of 3.59 with 95% CI of 1.83 - 7.04) or syphilis serology. The absence of association between genital discharge and HIV infection might be related to the fact that genital discharge are not so specifically associated with sexually transmitted diseases.

Sexual intercourse during menstruation and post-coital genital bleeding were also factors mentioned as being associated with HIV seropositivity [24, 57]. We did not find such association between having sex during menses and HIV infection. On the other hand, traumatic genital bleeding during intercourse was one of the variables which had significant and independent association with seropositivity even after adjustment in the multivariate model (odds ratio of 2.34 with 95% CI of 1.01 - 5.41). It might be that traumatic lesions facilitate HIV entry. However, the vaginal mucosa of HIV-infected women is more fragile, thereby resulting into more frequent bleeding after traumatism.

The effect of vaginal douching after and before intercourse has been a controversial issue depending on the type of fluid used. The use of commercial detergents has been shown to increase the risk of cervical infection [76]. In a study in Thailand, the use of water alone was

shown to be a risk factor [40]. In the present study, cleansing with soap after sex was protective against HIV infection (OR = 0.49 with 95% CI 0.25 - 0.94).

There is also controversy around the possible association between hormonal contraceptive use and HIV infection. A study in Thailand among CSWs has found a statistically significant association between use of injectable contraceptives and HIV infection [77]. Among the possible explanations given was the thinning of vaginal epithelium following the use of such hormones. In addition, it was also assumed that since these hormones lead to amenorrhoea they may allow more frequent sexual activity by the sex workers [77]. In the present study, use of injectable hormones was not associated with HIV infection.

Thirty-nine percent of the respondents said that they knew someone with AIDS. These women were less likely to be HIV-infected in univariate analysis (OR = 0.49, 95% CI= 0.26-0.93). Remembering seeing someone with AIDS had been associated with low risk behavior among homosexuals in USA [78]. More efforts in the public recognition of AIDS cases could serve as one way of reduction of high risk behavior. Almost 50% of the respondents thought that someone looking healthy could not be HIV infected. This false perception was associated with higher HIV prevalence in univariate analysis, and may be a correlate of the increased in risk of HIV infection in women who used criteria to select their clients. Interestingly, women who thought that they were HIV-infected were in fact less likely to be (p= 0.06 in multivariate analysis), possibly as a result of their awareness of the risk.

A cohort study in Kenya which was conducted between 1985 and 1994 on 424 initially seronegative prostitutes in Nairobi had shown a statistically significant decline in the incidence

of HIV-1 seroconversion with longer duration of prostitution (odds ratio of 0.92 with 95% CI 0.89 - 0.96). In addition, a small group of women (10% of the cohort) remained persistently seronegative [19]. Our efforts to identify women who remained HIV-negative despite many years of sex work (at least five) have resulted in the identification of twenty five women. Restricting the analysis to women with more than five years of sex work, the same factors associated with HIV-positivity were found, when compared to the analysis on all women. This suggests that even in this sub-group of women, behaviours play a major role in remaining HIV-negative. However, we identified seven women remarkable by their absence of HIV infection despite sharing at least four of the identified risk factors for HIV infection. These women may indeed be protected by biological factors, either genetic or immunological. Their blood cells will be subject to further laboratory analysis, in the hope that such protective factors can be identified.

Validity of the study

All the possible scientific precautions were taken to make the results of this study valid. The instrument used on the target population was a well pre- tested structured, closed- ended questionnaire. Strict and regular daily supervision of the data collectors and checking of the completeness and accuracy of the data was carried out to ensure the quality of the work. Multivariate analysis using logistic regression model was performed to control for possible confounding effect of all other variables by analyzing all variables with the best models (predictors). As far as issues of generalizability is concerned the study result may not be generalizable to all CSW in Addis Ababa since it was cconducted on those CSW who were attending STD clinics.

Limitations of the study

As of any other cross-sectional study it would be difficult to determine the temporal relationship between exposure and outcome in the study. The results of the study may not be generalizable since it was done on STD clinic attenders. Since the interviewers are medical personnel, over-reporting of some of the protective methods might have occurred by the respondents (e. g condom use), and also there might have been under-reporting of some of the sensitive behavioral issues (e. g frequency of sex, number of clients per day). Since the data collection period was long, contamination of information may have occurred among the study population.

Conclusions and recommendations

HIV prevalence was extremely high among sex workers of Addis Ababa. The present study has identified eight independent factors associated with HIV infection. Higher education, cleansing with soap after sex, instruction by peers were protective against HIV infection. On the other hand, bleeding after sex, using criteria to select clients, history of genital ulcer in the past years, positive syphilis serology, and living in shared rooms were associated with increase in risk of HIV infection. This study had also identified a sub group of CSWs who worked for more than five years (25/312) and remained uninfected. The blood cells of those women who remained seronegative despite long years of exposure and sharing at least four of the identified risk factors for HIV-1 infection will be subject to further laboratory analysis.

Based on the results of this study the following recommendations were given:

1. Strengthening of peer education programs.
2. Early diagnosis and treatment of STDs
3. Close follow up and counseling services regardless of HIV status, especially for those who live in economically deprived conditions (sharing rooms)
4. Conducting further survey on the type of soap the sex workers used which helped for the relative protection.

5. Encourage more participation of HIV/AIDS cases for public education.
6. Creating alternative employment opportunities for sex workers and training of sex workers in different skills.

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Annex-1

Questionnaire

This paper will be kept strictly confidential and will be filled out only if you agree to take part in the study . A code number is used to preserve anonymity of the questionnaire , and the study results will serve in the evaluation of the risk of HIV/ AIDS by assessing individuals behaviour , socio- demographic characteristics , knowledge and attitiude .

Date of interview_____
Interviewer's Name_____
participant's code number_____

Socio- demographics

1.How old are you ?

____ years
77. refuses to answer
99. unknown

2. What is your nationality ?

1. Ethiopian
2. Foreigner

3. a .What is your ethnic group ?

01. Oromo
02. Amhara
03. Tigre
04. Gurage
05. kambata
06. other
77. refuses to answer
99. unknown

3. b. If others, specify _____

4.a. What is your religion ?

01. orthodox Christian
02. catholic
03. Protestant
04. Muslim
05. no religion
06. other
77. refuses to answer
99. unknown

b .If other, specify _____

5. Is religion important for you

1. yes
2. no
9. unknown

6. Can you read and write ?

1. illiterate
2. can read but not write
3. can read and write
9. unknown

7. which level of education did you achieve ?

0 1. No schooling(none)
0 2. Participated in the national literacy campaign.
03. grade 1-6
04. grade 7-8
05. grade 9-12
06. 12 grade complete + other courses
77. refuses to answer
99. unknown

8. Where is your place of birth?_____

9. For how long have you been a resident of Addis Ababa ?

_____years
77. refuses to tell
99. unknown

10. Family educational status

10a) what was your father's educational status ?

1. Illiterate
2. literate
9. unknown

10b) what was your mother's educational status ?

1. illiterate
2. literate
9. unknown

11. How many children have you had in your life ?

_____ children

11 a) How many of them are alive ?

_____ alive

11 b) How many of them are dead ?

_____ dead

12. What is your average daily income ?

_____birr
99. unknown

13. What is your average monthly income ?

_____ birr

99. unknown

14. How much do you get on a good day ?

_____ birr

77. refuses to tell

99. unknown

15.a. Have you ever been married ?

1. yes
2. no
7. refuse to tell

15. b. If yes, what happened to your marriage ?

1. separated
2. runaway
3. divorced
4. widowed
7. refuse to tell
9. unknown

16. If not married do you have a regular partner ?

1. yes
2. no
7. refuses to answer
9. unknown

17.a. If widowed ,what was the cause of death of your spouse ?

1. accident
2. disease
3. other
7. refuse to tell
9. unknown

17.b. If other , specify _____

18.a. If it was due to disease ,what was the disease?

1. tuberculosis
2. pneumonia
3. severe wt. loss
4 chronic diarrhoea
5. other (skin infection ,etc.)
7. refuse to tell
9. unknown

18. b. If other specify _____

Risk - behaviour and sex work history.

19. At what age have you started sexual intercourse ?

_____years

99. unknown

20. In which circumstances did you have your first intercourse ?

1. At official marriage, with her consent
2. At official marriage ,without her consent
3. without marriage, but with consent
4. Without marriage, without consent
5. don't remember
7. refuses to tell
9. unknown

21. Was your first sexual intercourse during sex work ?

1. yes
2. no
9. unknown

22a. What was your occupation before you started to work as a CSW ?

1. I was a student
2. I was a house wife
3. house maid
4. government employee
5. no occupation
6 . other

22 b. If other specify_____

23. Did you get any instruction to work as a CSW ?

1. yes
2. no

24.a. If yes ,by whom did you get the instruction ?

1. peers/ other CSW /
2. bar owners
3. relatives
4. friends
5 others
7. refuses to tell
9. unknown

24b . b. If others , specify _____

25. What were the instructions about ?	yes	no	unknown
25a. risk of HIV	1	2	9
26b. risk of STD	1	2	9
25c. condom use	1	2	9
25d. client handling	1	2	9
25 e. diagnosis and treatment of STDs	1	2	9
25 f . contraceptives	1	2	9

25g. If others , specify_____

26. In which of the following sites have you been working in the past 5 years?

	yes	no	unknown
26 a. bars	1	2	9
26 b. hotels	1	2	9
26 c. tella and arake houses	1	2	9
26 d. Individually owned rooms	1	2	9
26 e. shared rooms with peers	1	2	9
26 f. red houses/ night clubs	1	2	9
26 g. streets	1	2	9

26 h. If others, specify_____

27. Where are you currently working ?	yes	no	unknown
27 a. bars	1	2	9
27 b. hotels	1	2	9
27 c. tella and arake houses	1	2	9
27 d. individually owned rooms	1	2	9
27 e. shared rooms with peers	1	2	9
27 f . red houses/ night clubs	1	2	9
27 g. streets	1	2	9
27 h. others	1	2	9

27 I. If others, specify_____

28.Where is your working site located ?

1. center of the city
2. periphery
9. unknown

29. For how many years have you worked as a CSW ?

_____ years

77. refuses to tell

99. unknown

30. For how many years have you worked as a CSW in the following geographic areas ?

30a) urban _____ years
99. unknown

30 b) rural _____ years
99. unknown

31 . For how many years have you worked in the current site?
_____ months,
_____ years,
99. unknown

32.a. In which of the following settings have you worked the longest ?
01. bars
02. hotels
03. arake and tella houses
04 individually owned rooms
05. shared rooms with peers
06. red houses /night clubs
07. streets
08 others
77. refuses to tell
99. unknown

32 b. If other , specify_____

33. What was your longest time in one working site ?
_____years
99. unknown

34. What was the shortest time in one working site ?
_____ months
_____ years
99. unknown

35. How much do you charge per sex service during the day time ?
_____birr
77. refuses to tell
99. unknown

36. How much do you charge per night sex service ?
_____birr
77. refuses to tell
99. unknown

37. On average how many sexual partners (clients) have you had per day in the past12 months?

_____ clients
77. refuses to tell
99. unknown

38 . How many sexual partners (clients) do you have on a good day (busy day) ?

_____clients
77. refuses to tell
99. unknown

39. How many clients did you have on your last working day ? (e.g. yesterday)

_____ clients
77. refuses to tell
99. unknown

40. Does it often happen that you have more than one sexual intercourse with the same client in one day?

01. never (0 %)
02. rarely (1- 29 %)
03. occasionally (30-59%)
04. often (60-94 %)
05. almost always (95-99%)
06. always (100%)
77. refuses to tell
99. unknown

41. Are your clients the same people coming back ?

01.none (0%)
02. few (1- 29 %)
03. some (30-59%)
04. most (60-99 %)
05. all (100%)
77. refuses to tell
99. unknown

42.what are the origins of most of (> 50%) your clients ?

1. urban Ethiopians
2. rural Ethiopians
3. foreigners
4. don't know them
7. refuses to tell
9. unknown

43.a. What is the occupation of most (>50%) of your clients ?

01. field workers
02. daily laborers
03. Long distance truck drivers
04. soldiers and policemen
05. merchants
06. teachers
07. students
08. office workers
09. factory workers
10. mixed
11.. others
77. refuse to tell
99. unknown

43 b. If others, specify _____

44a . Did you ever use condoms ?

1. yes
2. no
7. refuses to tell
9. unknown

44b. If yes ,how many years ago have you started to use condoms ?

_____ years
77. refuses to tell
99. unknown

45. Can you find condoms when you need them ?

01. yes
02. no
88. I don't use them
99. unknown

46. In which circumstances do you not use condoms with clinets?

	yes	no	unknown
46a. clients refusal	1	2	9
46b. to satisfy clients	1	2	9
46c. not available	1	2	9
46d. I use other contraceptives	1	2	9
46e. don't know its importance	1	2	9
46f. clients high payment	1	2	9
46g. during forced sex	1	2	9
46h. When forced by owners	1	2	9
46i. Others	1	2	9
46j. Specify	_____		

47. How often have you used condoms with clients in the past year ?

01. never (0 %)
02. rarely (1- 29 %)
03. occasionally (30-59%)
04. often (60-94 %)
05. almost always (95-99%)
06. always (100%)
77. refuses to tell
99. unknown

48. How often have you used condoms with regular partners in the past year ?

01. never (0 %)
02. rarely (1- 29 %)
03. occasionally (30-59%)
04. often (60-94 %)
05. almost always (95-99%)
06. always (100%)
77. refuses to tell
99. unknown

49. How many years ago have you started using condoms to the level you are using today?

49a) with regular partners _____years
99. unknown

49b) with clients _____ years
99. unknown

50. Do you refuse sex without condoms with your regular partners ?

1. yes
2. no
3. depends on the type of partners
7 . refuses to tell
9. unknown

51. Do you refuse sex without condoms with clients ?

1. yes
2. no
3. depends on the type of clients
7. refuses to tell
9. unknown

52 . Did you use condom with your last client ?

1. yes
2. no
7. refuses to tell
9. unknown

53. Do you have any criteria of client selection (or rejection)?

1. yes
2. no

54 . If yes , what are your criteria of selection ?	yes	no	unknown
54a. cleanliness	1	2	9
54b. wealthy	1	2	9
54c. fat men	1	2	9
54d. healthy looking	1	2	9
54e. genital inspection	1	2	9
54f. absence of skin disease	1	2	9

54g. If other specify _____

55. Have you ever rejected clients?

1. yes
2. no
7. refuses to tell
9. unknown

56. How many have you rejected in the past month ?

_____clients
99. unknown

57. Have you ever used the following sexual routes ?	yes	no	unknown
57a. peno - anal	1	2	9
57 b. peno - oral	1	2	9
57c. masturbation	1	2	9

57d. If other specify _____

58. Do you experience bleeding during intercourse ?

01. never (0 %)
02. rarely (1- 29 %)
03. occasionally (30-59%)
04. often (60-94 %)
05. almost always (95-99%)
06. always (100%)
77. refuses to tell
99. unknown

59. Do you have intercourse during menses ?

01. never (0 %)
02. rarely (1- 29 %)
03. occasionally (30-59%)
04. often (60-94 %)
05. almost always (95-99%)
06. always (100%)
77. refuses to tell
99. unknown

60.Do you do post- coital cleansing ?

01. never (0 %)
02. rarely (1- 29 %)
03. occasionally (30-59%)
04. often (60-94 %)
05. almost always (95-99%)
06. always (100%)
77. refuses to tell
99. unknown

61.a. If you do , with what do you do cleansing ?

1. with water
2. with water and soap
3.other solutions

61b. If others, specify _____

62. Have you taken medication for genital discharge in the past year?

1. yes
2. no

63. If yes , how many times ?

_____ times
77. refuses to tell
99. unknown

64. Have you taken medication for genital ulcer in the past year ?

1. yes
2. no

65. If yes , how many times ?

_____ times
77. refuses to tell
99. unknown

66. Have you ever used contraceptives in the past/ including condoms ?

1. yes
2. no

67. If yes, what was it ?	yes	no
67 a. oral pills	1	2
67 b. injectables	1	2
67c. local spermicides	1	2
67d. tubal ligation	1	2
67e. IUD	1	2
67f. norplant	1	2
67g. condoms to prevent pregnancy	1	2
67h .diaphragm	1	2
67I. condom + spermicides	1	2
67j. diaphragm + spermicides	1	2
67k. mixed	1	2
67l. others	1	2

67m. If others, specify _____

68a. If yes , What do you use currently ?

01. oral pills
02. Injectables
03.local spermicides
04. tubal ligation
05. IUD
06. norplant
07 .condoms to prevent pregnancy
08. diaphragm
09. condom + spermicides
10. diaphragm + spermicides
11. mixed
12. others
88. no contraceptives

68b. If others, specify _____

69. Do you have any history of substance intake ?

1. yes
2. no
7. refuses to tell
9. unknown

70. If yes , which one do you take ?	yes	no
70a. chat	1	2
70b. narcotics	1	2
70c. hashish	1	2
70d.others	1	2

70e. If others , specify_____

71. Do you drink alcohol when you see clients ?

01. never (0 %)
02. rarely (1- 29 %)
03. occasionally (30-59%)
04. often (60-94 %)
05. almost always (95-99%)
06. always (100%)
77. refuses to tell
99. unknown

72. Are you often intoxicated due to alcohol intake when you meet your clients?

01. never (0 %)
02. rarely (1- 29 %)
03. occasionally (30-59%)
04. often (60-94 %)
05. almost always (95-99%)
06. always (100%)
77. refuses to tell
99. unknown

73. Are your clients drunk / intoxicated when you have sex with them ?

01. never (0 %)
02. rarely (1- 29 %)
03. occasionally (30-59%)
04. often (60-94 %)
05. almost always (95-99%)
06. always (100%)
77. refuses to tell
99. unknown

74. How many visits do you have to health facilities for sickness in the past 12 months ?

_____ visits
77. refuses to tell
99. unknown

75a. Why do you come to the health center today?

1. genital ulcer
2. genital discharge
3. other genital disease
4. other non-genital disease
5. other

75b. if other specify _____

76.a. Have you ever been hospitalized in the past 5 years ?

1.yes

2. no

76b. If yes , why were you hospitalized ?_____

76c. If yes , for how long ?

_____ days _____weeks _____months

77. How many induced abortions have you had in lifetime ?_____

_____ abortions

77. refuses to tell

99. unknown

78. If yes ,where was it ?	yes	no	unknown
78a. gover. hospitals	1	2	9
78b. private hospitals	1	2	9
78c. at individuals houses	1	2	9
78d. other	1	2	9

78e. if others, specify _____

79. Do you think that someone looking healthy can be HIV infected ?

1. yes

2. no

80. Do you think that people can be resistant to infection with the virus ?

1. yes

2. no

81. Do you think good medical service helps improving the course of HIV infection .?

1.yes

2. no

82. Do you think there is a cure for AIDS ?

1.yes

2. no

83. Do you think it is possible to prevent oneself from HIV/ AIDS ?

1. yes

2. no

84. Which of the following do you think can protect you from HIV ?

	yes	no	unknown
84 a. condoms	1	2	9
84 b. spermicides	1	2	9
84 c. pills	1	2	9
84 d. diaphragm	1	2	9
84 e. Injectable hormones	1	2	9
84 f. antibiotics	1	2	9
84 g. others	1	2	9

84 h. If others , specify_____

85. Do you know anybody with HIV / AIDS ?

1.yes
2. no

86. Do you think that you are at risk of contracting HIV/AIDS ?

1. yes
2. no
3. difficult to tell

87. Are you afraid of AIDS ?

1. yes
2. no

88. Do you think that you might be HIV infected ?

1. not at all
2. may be
3. yes
4. I don't know

89. Will you be interested to know the result of your HIV test ?

1. yes
2. no
3. no difference
7. refuses to answer
9.unknown