ADDIS ABABA UNIVERSITY

SCHOOL OF GRADUATE STUDIES

Behavioral and sero prevalence survey of HIV 1 infection in Asosa, Benishangul –Gumuz National Regional state

By

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A Thesis submitted to the school of graduate studies of Addis Ababa University in Partial fulfillment of the requirement for the degree of masters of public health.

December 2001

Addis Ababa

Acknowledgement

I would like to acknowledge first and for most my advisors Prof. Derege kebede from Department of Community Health and Dr Eduard Sanders, ENARP manager who gave me a constant advice, follow up and comments from the design of the research proposal up to the end.

My heartfull gratitude goes to my advisors Dr Shabbir Ismail and former head of Department of Community Health, Dr Yemane Berhane who helped me giving an advise in selecting study subjects for HIV prevalence study and reviewing and giving in valuable comments for final write up. I would like also to acknowledge Dr Abera Kumie for his comments and suggestion.

I would like to extend my foremost and deepest gratitude to WHO, Country Office of Ethiopia The study would not been materialized with out their financial support.

My sincere thanks go to Drs Ahmid Ali and Hailu Yeneneh for their efforts in getting me financial support.

I would also like to express my appreciation to Dr Michel Jancloes country representative of WHO in Ethiopia, Dr Eyobe Tsegaye and Ato Belachew Chanyalew, for their genuine cooperation and assistance.

I would also like to express my appreciation to Benishangul-Gumuz Regional Health Bureau, all staff of MCH department in Asosa Hospital, Asosa Health Center and Bambasi Health Center who gave me support and encouragement.

Finally I would like to acknowledge the research team and study participants especially female sex workers who took their time and dedication in carrying out this research.

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Lists of abbreviations used

AIDS	Acquired Immuno Deficiency Syndrome
ANC	Antenatal clinic
C and T	Counseling and Testing
DHS	Demographic Health Survey
DK	Don't know
EHNRI	Ethiopian Health and Nutrition Institute
ENARP	Ethio- Netherlands AIDS Research Project
FSW	Female sex workers
FHI	Family Health International
HIV	Human Immuno Deficiency Virus
MOH	Ministry Of Health
NGO	Non Governmental Organization
RA	Refused to Answer
SD	Standard Deviation
SSA	Sub Saharan Africa
STD	Sexually Transmitted Diseases
STI	Sexually Transmitted Infections
UNAIDS	Joint United national program on HIV/AIDS
WHO	World Health Organization
VCT	Voluntary Counseling and Testing

Abstract

Measuring the occurrence of HIV infection is insufficient to make useful recommendations on health education strategies for the population. We assessed high-risk behaviors for HIV transmission in the general population and female sex workers, willingness for voluntary counseling and testing and HIV prevalence among pregnant mothers. A cross-sectional study on high-risk behavior among commercial sex workers and a random selection of the general male and female population was conducted from March to April 2001 in Asossa town. Simultaneously, anonymous unlinked surveillance for HIV was conducted in Asossa and Bambasi town. Mean age at first marriage for the general population and commercial sex workers was 18.9 and 15.2 years, respectively. [t=4.93; 95 % CI of 2.58-5.08]. Of 527 adults 67 (12.7%) engaged in commercial sex and 88 (16.7%) had non-regular sexual contacts in the 12 months prior to the survey. Mean age at which female sex workers first received money for sexual intercourse was 18.4 years. Persistent use of condoms by female sex workers with paying and non-paying client was 74% and 64.9% respectively. Knowledge on HIV prevention and willingness to receive voluntary counseling and testing was very low in both commercial sex workers and general population. HIV prevalence in Asossa town was 19.3% (34/176) and outside of Asossa (including Bambasi) was 4.7% (4/85). For urban residence, highest HIV prevalence was found in pregnant mothers of 15-19 years of age and only low income (<Birr 100) was significantly associated with HIV infection. High HIV prevalence found in Asossa town may overestimate HIV prevalence in the general population since a concurrent behavioral survey was conducted among commercial sex workers. Surveillance for HIV among pregnant mothers should be repeated annually. HIV preventive messages may be especially directed to low-income families. There is a need to increase HIV awareness in Benishangul-Gumuz.

Introduction

The first cases of Acquired Immuno Deficiency Syndrome (AIDS) in the United States were recognized and described in 1981. The syndrome was first described among homosexual men, with a pattern of unusual infections (such as pneumocystis carinii pneumonia) [1] in otherwise healthy young adult. In the following year, it was recognized in intravenous drug users and reports came from recipients of blood or blood products[2].

In 1985 the scope of the epidemic had grown and at least one case had been reported in each region of the world. After almost 20 years the disease is now spread to every corner of the world. At the end of 2000 about 22 million people had lost their lives and over 36 million people were living with the virus. [2]

It is clearly seen that HIV/AIDS has spread at varying rates in different parts of the world, among various population sub-groups. The picture of infection has been greatly modified in Western Europe [3]. The incidence rate has decreased and deaths are delayed due to clinical advance in therapy. Nearly 95 % of HIV cases and death exist in the developing world, with over 70 % of those living with HIV located in sub-Sahara Africa [2,3,4]. Even in sub-Saharan African countries differences in HIV /AIDS spread have been documented. For instance in many large towns in Central, Eastern and Southern Africa the prevalence rate among pregnant women currently exceeds 30 % while in many cities and towns of west Africa, prevalence in pregnant women is less than 10 % [5].

About 70-80 % of global transmission is attributed to sexual acts. Risk increases with different factors such as the presence of STIs, having more than one partner, and unprotected sex with

high-risk groups such as commercial sex workers. Other modes of transmission are mother to child, blood transfusion and unsafe injection [2-6].

It was in the early 1980s that the Global Program on AIDS of the World Health organization (WHO) declared HIV as a global pandemic and tried to promote worldwide surveys on Knowledge, Attitude, Belief and Practices (KABP) on HIV/ AIDS. Detailed analysis of reliable data shows a decline in both the incidence and prevalence of the infection in parallel with a change in high-risk behaviors. For example social scientists from Uganda presented surveys of sexual behavior from 1989 and 1995 [8]. These give an idea of changes in current behavior in various age groups in the urban setting. Changes include a rise in age at first sex and more use of condoms in the cities. These changes have been supported by findings of epidemiologists including a drop in new infections and a rise in the distribution and sales of condom [8-10]. Similar findings have been documented in Thailand and urban Tanzania in which the recent decline in new infection was attributed to changes in high-risk behavior occurring some years earlier.[11, 12]

Another area where great impact had been made on high-risk behavior change is by HIV counseling and testing .[13-17] As described by Allens et al, an increase in condom use and lower rate of sero conversion through VCT have been seen in discordant couples in Africa [12]. A similar finding such as a lower rate of coercive sex by male partners and reduction in risky sexual behavior was documented in HIV discordant couple in Rwanda after they completed counseling programs .[13]

A potential area of focusing counseling and testing is in the prenatal setting which carries many benefits .[17-19] In case of negative test results, it reinforces a pattern of behavior that decreases chance of becoming infected and help to relieve anxiety. In the other extreme of a positive test result, it enables a woman to receive the benefits of therapeutic care and to have the opportunity

to consider their current and future pregnancy and child bearing. In addition the risk of maternal to child transmission has been greatly modified by identifying the infection and combining intervention in these settings. [17,51]

The current HIV/AIDS surveillance system to monitor the epidemic is not satisfactory, particularly in the developing world. According to the regional consensus reached in a conference conducted in East Africa by UNAIDS health specialists, social scientists and epidemiologists, the existing system, which monitors progression of infection, is not enough. [20]. It was suggested to investigate trends of infection alongside trends in behaviors that lead to it .[20] It emphasize that data collection should focus on populations most at risk of becoming newly infected, in populations with high level of risk behavior or young people at the start of their sexual lives. Second-generation surveillance combines the previous data collection methods in appropriate population and sub-population.

Literature Review.

HIV/AIDS the Global pandemic

Human immuno deficiency virus (HIV) infection and acquired immuno deficiency syndrome (AIDS) have become one of the greatest challenges to global public health. As a blood borne and sexually transmitted infection, HIV has varying patterns of transmission and impact among the various regions. Since 1983, the HIV was identified as the cause of AIDS in Africa. [6] In the continent, especially in sub-Saharan countries adults and children are acquiring HIV at a higher rate than ever before. This region of the world is most severely affected by HIV and AIDS. [2-4] Uganda, Kenya and Tanzania were among the countries where the HIV epidemic was first recognized during the early 1980s[2]. In 2000, an estimated 25.3 million person in Sub Saharan Africa were infected with HIV and the average national prevalence of HIV infection among persons aged 15-49 years was 8.8%[2]. Approximately four million new infections occurred during 2000 [2,3] and nearly 10% of persons aged 15-49 years are infected in 16 countries, including seven in southern and eastern Africa, where approximately 20 % are infected. In Botswana, the country with the highest prevalence rate, 36 % of the adult population is infected with HIV. In seven countries all in the southern cone of the continent, at least one adult in five is living with the virus .[2,3] A recent survey in South Africa reported, an of infection rate of 19% among 17-20 years and 43.1% among 21-25 year olds [3.]

In most parts of Africa, where HIV prevalence is extremely high, transmission is associated with factors that include multiple sexual partners, commercial sex and history of STDs [32,35,39,42] The most important factors incriminated, which put people at risk of infection, are lack of

information and education. The problem is common in those people who have high-risk sexual behaviors.

Intensive and aggressive prevention programs for behavior change; condom promotion, voluntary HIV counseling and testing, and blood transfusion safety have lowered prevalence or slowed HIV transmission change in several Sub Saharan Africa countries. For example, in Uganda during 1990-2000, overall adult HIV prevalence declined from 14 % to 8% [2,8,9]. In Masaka, Uganda, HIV prevalence among females aged 20-24 years decreased from 20.9 % during 1989-1990 to 13 % during 1996-1997[9]. The prevalence rate in young pregnant women in this country started to decrease between in year 1991 and 1993 which was the first significant downturn in a developing country to be attained through a successful country wide mobilization against the epidemic [8]. Age specific trends in HIV-1 prevalence between 1991 and 1997 among antenatal clinic attendees by Kilian et al showed a declining trend of HIV prevalence in women aged 15-19 and 20-24. The author further explained this reduced incidence of HIV infection as attributable to change in high-risk behavior [9]. In Uganda, repeated behavioral surveys consistently showed a delay in sexual initiation and more condom use than in the past. In West Africa, Senegal has maintained a prevalence of approximately 2%; prevention efforts have included regulating commercial sex, intensive condom promotion, treatment of sexually transmitted disease (STDs) and community mobilization[2].

African countries like Senegal and Uganda have the best HIV surveillance systems and provide solid evidence that the HIV infection rate has stabilized at relatively lower level. In Zambia by involving all sectors in HIV prevention, their sentinel surveillance system show that the percentage of pregnant girls aged 15-19 years infected with the virus has dropped by half in the six year period 1993-1998. The finding has been substantiated with a parallel reduction in the

prevalence of high-risk behavior [3]. A comparison of studies on sexual behavior conducted during the years 1990, 1992, 1996 and 1998 suggests that these falling HIV rates are due in part to a decrease in some types of risky sexual behavior in urban areas. For example, far fewer young women in Lusaka were having sexual intercourse before marriage in 1996 than in 1990, and the percentage of unmarried women who were sexually active fell from 52% to 36 % over the period. The proportion of men reporting two or more casual partners in the past year also fell [3].

The HIV/AIDS epidemic in Ethiopia started around 1984 .[23] It is now 17 years old and the epidemic has spread everywhere and no region or zone in the country is spared[22]. The total number of infections in the year 2000 was estimated to be 2.6 million and the number of AIDS cases could reach up to 400,000 [22.] The most important mechanisms for transmission in the country are sexual contact, prenatal, blood transfusion and unsafe injection. According to the reports submitted to MOH, 87 % of the cases were due to multiple sexual acts and a smaller number were due to contaminated blood transfusion and unsafe injection [22.] Several sero surveys conducted in Ethiopia have proven that the prevalence of the infection is increasing at an alarming rate, though most of the reports came from a few urban sites [31-35]. Serial data on the proportion of students who use condoms are available for Addis Ababa and Gondar only[28].

According to the reports of the Demographic and Health Survey 2000 in Ethiopia, 85 % of women and 96 % of men have heard abut HIV/AIDS. More than 75% of women and 90 % of men believe that, there is a way of avoiding AIDS. In the report, 37% of women and 55% of men believe that healthy-looking people can have the AIDS virus and 52 % of women and 72 % of men recognized maternal to child transmission. Knowledge on maternal to child transmission showed that 25 % of women and 33 % of men were aware of vertical transmission during pregnancy. The survey further showed that 25% of women and 33% of men knew someone who

had died from AIDS. It was only 2 % of the participants of the survey have been tested for HIV before. In the survey 37% of women and 19% of men have no knowledge of STI. More than 50 % of men and 22% of women mentioned at least two symptoms of STI. [37]

Different levels of knowledge for HIV transmission and misconception have been documented worldwide. An extremely low awareness of AIDS, sexually transmitted disease and condoms was documented in Dai villagers in Yunnan province, China .In the study it was found that 18 % of the respondents had heard of AIDS and only 25 and 28 % respectively, had heard of STDs or condoms [44]. On the other hand high knowledge score have been documented in women attending ANC in Coted' Ivoire though the vast majority were not aware of vertical transmission and more than 50 % of them missed the potential carrier of the infection in healthy looking man [18].

In Ethiopia various studies have been done to identify factors influencing occurrence of HIV/AIDS. Larson et al in Jimma documented high-risk behavior as early as 1988. More than 40 % of the respondents had sexual intercourse with prostitutes and had contracted sexually transmitted disease in the past [36]. Satisfactory knowledge scores have also been documented in students at different levels [24-25]. In most of the studies misconception on some modes of transmission was common which may cancel high cognitive score [17,18,33]. Knowing about how the disease is transmitted is of no use if individuals do not know that they could become infected from an asymptomatic carrier who looks well and healthy.

Another most dangerous practice that is common both in developed and developing countries is having sexual intercourse influenced by alcohol. Most heterosexual men and women who had sex under the influence of alcohol were more likely to practice high-risk sex. In one alcohol treatment center in San Francisco, 54 % of the respondents, had non-monogamous relations in the past and 97% of them did not use condoms during all sexual acts [48]. HIV prevalence in 1998

in South Africa among alcohol consumers was above 50 % for women and above 30 % for men in the general population [3].

HIV /AIDS surveillance in the next decades

By considering the diversity of the HIV epidemic around the world, experts in the field of disease prevention and control agreed to update the existing surveillance system in HIV/AIDS control. In the next decade, surveillance systems aim to concentrate resources to yield information that is most useful in reducing the spread and providing care for those affected [67]. More attention is directed towards in comparing information on HIV prevalence with the behaviors that spread it, so as to build up an informative picture of changes in the epidemic over time .The use of other sources of information such as communicable disease surveillance and reproductive health surveys is advised.

Data, collected at different levels, should be varied according to the epidemic state. If the problem is uncommon, bio-medical and behavioral data can provide early warning. Where it is concentrated in sub-populations with high risk-behavior it can provide invaluable information for designing focused interventions. On the other extreme of the generalized epidemic, data collection can help indicate the success of response and provide essential information for planning, care and support [67].

Some countries, like Uganda and Thailand, have identified the problem early and modified their surveillance systems [8-11,47]. Information about who is at risk and which behaviors put them at risk is well documented. Solid behavioral data will identify sub-populations at risk and help to focus sero surveys in the areas where they will yield maximum information. The current data collection methods in given sets of population will be more informative if they follow the

recommended methods. The aim is to combine the already existing system and to use more rarely used methods particularly behavioral variables.

Second-generation surveillance system focus on to combining the previous data collection methods in appropriate populations and sub-populations to give greatest explanatory power. Conducting biological survey at sentinel sites is currently recommended by experts in the filled of HIV/AIDS control. Sentinel institutions are already drawing blood for other purpose. The most important groups are pregnant women and blood donors. Even if the representativeness of these sentinel groups is in doubt, results coming from these sites could help to estimate the magnitude of the problem especially in resource poor countries [50,51]. Women at the antenatal clinic provide the most accessible cross-section of healthy, sexually active women in the general populations are chosen as a common site for sentinel surveillance. According to World Health Organization guidelines some countries started unlinked, anonymous methods in different groups of the population. A comparative study between the general and sentinel populations in Tanzania revealed that female blood donors as a sentinel population represents more closely estimates of HIV-1 sero prevalence among women in the general population than ANC clinic attendees or male blood donors [49].

A recent study by Zaba et al advised categorization of prevalence data from antenatal surveillance system by both age and parity to aid in the intervention. They further discussed that antenatal clinic based HIV prevalence estimates could be useful as indicators of incidence if the age group were wide (15-24 rather than 15-19 years) and parity based information were attached to it in the context of second-generation surveillance [50]. Use of ANC attendees for sentinel survey has few alternatives though limitations such as selection bias and infertility caused by HIV and other STDs exists. Other data collection methods recommended for second generation

surveillance include conducting behavioral surveillance in wider, different population groups in cohort or cross-sectional methods. This can be done in the general population, or a sub group of it to track changes in risky behavior over time.

Voluntary Counseling and Testing.

Voluntary counseling and testing is an effective prevention strategy to reduce HIV transmission. No other alternative has been demonstrated in high prevalence areas, were the largest proportion of discordant couples live [13,14,68]. VCT has important public health implications in terms of HIV-1 infection averted, and is more cost effective than any other intervention in developed and developing countries. The feasibility and beneficial effect of the services on HIV-1 related risk behavior change have been documented in a number of settings [13,16]. After the introduction of HIV testing, a number of settings have showed a great impact on behavior change by HIV counseling and testing [13-15,68]. The individual will make an informed choice about his status, referring infected individuals to appropriate medical and social services and reducing the rate of maternal to child transmission and sero conversion in discordant couples [12,13,17,61]. The benefit of counseling and testing in Africa has been shown in several studies. In Kenyatta National Hospital, women in antenatal clinic preferred not to be pregnant, if their HIV test was positive i.e. they were able to decide on current and future reproductive options [46]. Counseling and testing brought changes in high-risk behavior in Rwanda and Zaire. An increase in the use of condoms with regular partners and a reduction in the incidence of STI was noted [13,68]

Even though Voluntary Counseling and Testing is the best alternative in handling the epidemic, barriers to the services are not uncommon [38]. A number of socio demographic, behavioral, attitudinal and knowledge characteristics are associated with it. Some of the characteristics associated with test acceptors were documented [52-55]. Acceptance of HIV testing in an obstetric

setting in New York City revealed that 34.4 % of pregnant women agreed to take the test voluntarily but only 50 % of them returned for post test counseling. Demographic variables such as age less than 25 years old, race or ethnicity, previous counseling and time taken for counseling exhibited a strong relationship to testing and counseling [57]. Jones et al evaluated reasons for HIV test refusal in a South Carolina STD clinic. Nearly 21 % of the participants refused testing, and a higher positivity rate was documented in test refusers. Some of the reasons forwarded by them were, not feeling at risk for the infection and concern about confidentiality of test results. Higher-risk behavior was documented in test refusers than acceptors (3% Vs 1.4 %) [59]. A study in Grady Memorial Hospital, Atlanta, Georgia among women in an obstetric setting showed that young, black and single women with no formal education beyond high school accepted HIV testing and counseling. More acceptors than decliners thought the HIV testing and counseling session was valuable. More than 50 % of test acceptors agreed to take it because of concern about the risk of transmitting the virus to their fetus or infant. Willingness to be tested in a future pregnancy was higher in test acceptors than decliners [58]. Client risk behavior and perception of risk of infection or living in a high HIV prevalence area make people more likely to accept counseling and testing than people without these characteristics [55].

Summary of literature review

Human immuno deficiency virus has become a major challenge both in developed and developing nations. Many factors for transmission and prevention methods are well known and documented. Many countries handle the problem by mobilizing the community and using a surveillance system. One of the surveillance methods is to perform a behavioral survey for high-risk behavior such as age at first initiation of sex, age at first marriage, and number and types of sexual partner. Other factors which are most important are peoples' attitude for counseling and testing which is directly associated with most risky behaviors. The other method of surveillance, to perform a survey to establish the rate of infection and to update the existing system. It is advised to collect basic socio-demographic characteristics at a sentinel site and to include as many groups as possible such as antenatal care attendees, blood donors and patients in STI clinics. It is recommended that several methods we combined where possible, but that different methods of surveillance (i.e. behavioral and sero survey) should be performed in different groups of the population.

Objective of The Study

General

1. To Assess high-risk behaviors for HIV transmission in the general population and female sex workers.
2. To determine HIV prevalence among pregnant women in antenatal clinic attendees.

Specific objective

1. To determine socio demographic factors related to HIV/AIDS knowledge, misconception on prevention and viral transmission among the general population and commercial sex workers.
2. To describe determinants of willingness to voluntary counseling and testing.

Subjects and Methods

Study Design.

A cross-sectional descriptive study to determine HIV prevalence among ANC attendees and high-risk behavior in the general population and commercial sex workers. It was conducted in Asosa town, Benishangul-Gumuz National Regional state from March to May 2001.

Study Area.

The study site, Asosa town, is the capital city of Benishangul Gumuz National Regional State. It is located in the Northwest of the country (Ethiopia); around 680 km from Addis Ababa .The total number of people living in the town by the end of January 2001 was 16,118. The native ethnic group in the town is Bertas, but other ethnic groups namely Amhara, Oromo, Agew, Tigre have been living in the Asosa for long time. The official language is Amharic, which is used for every activity including education. The town is administratively divided into four kebeles with no major differences in ethnicity, education and economic status.

Sample size determination

a) The number of study participants required for the behavioral survey among the general **population** was calculated using the formula for a single proportion,

$$n = (z\ \alpha\ ½)^2 .p\ (1-P)/d^2$$

Where p= 50 % of adults in the general population have used some form of preventive behavior for HIV prevention such as condom use with a non-regular sex partner. This is taken to get the maximum sample size and because the exact prevalence is not known for that area. The minimal difference is taken as 3.5 % (d=3.5 %) with 95 % confidence of certainty. The total sample size required with 20% contingency was 936

b) Female commercial sex workers: We applied the same formula as was used for the general population. The assumption made was that the proportion of female sex workers who have used some form preventive behavior such as condom use during all sexual contact was 50%, detecting 5 % margin of error and with 95 % confidence of certainty gave the required sample size of 384.

c**) Pregnant women attending ANC**. We used a quota sampling method to get enough samples of women in the specified time period from March to May 2001.

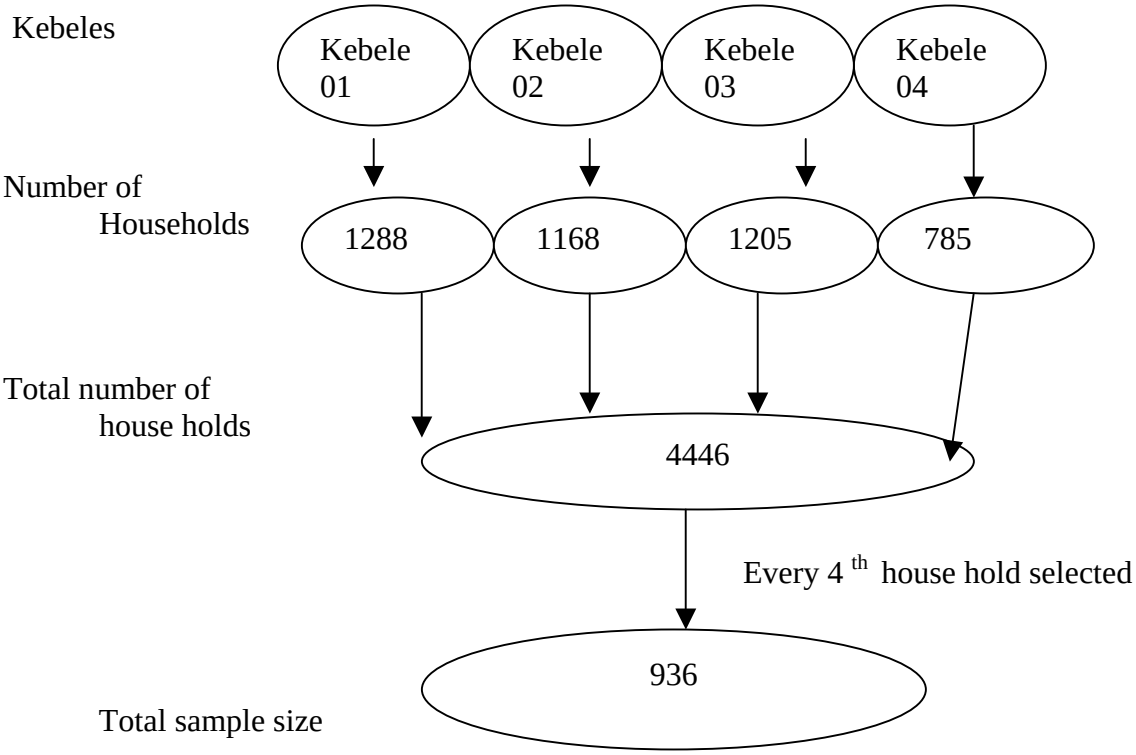
Source population: All adults in the age group 15-49 in Asosa town, all commercial sex workers and women attending ANC in the hospital and two health centers during the study time.

Sampling procedure.

A) Behavioral survey

1 The general population: The study population was drawn using a systematic sampling method. This was done in two stages. First a review of records was made and the total number of house holds in each kebele was identified which gave a total of 4446 .We took a sampling interval of four households to get the required number of study subject. All individuals who were living in selected households were registered by name, age, sex, and responsibility in those households. Fifteen enumerators with five supervisors conducted registration for one week. After completion of registration the principal investigator and supervisor arranged a sampling frame by re-registration of eligible age groups (15-49 years of age) in every households. By using a lottery method one individual was selected from a household for interview. If a selected house had no eligible individuals or refused interview, the next house was taken. Households that were included for enumeration were those that serve only for living purpose. Shops, food and drinking establishment and other undertakings were not included.

Fig 1. Diagrammatic presentation of sampling procedure for Adults, in Asosa town



2) Commercial sex workers. Commercial sex workers were selected from food and drinking establishments such as bars, hotels, or from their homes for home based commercial sex workers. The regional Trade, Industry and Tourism Bureau has registered all food and drinking establishments every year and the Regional Disaster Prevention Labor and Social Affairs Office registered all commercial sex workers to help them in some micro financing activities. We used this information as sampling frame for sample selection. The Regional Disaster Prevention Labor and Social Affairs Office had registered a total of 85 bar based sex workers in the year 1999-2000 (office document, personal communication)

After obtaining the verbal consent of the owner of each drinking, food and pension establishment, a review of the registration book of workers in each of the institutions was made. The total number of bar based sex workers was 170 and those working in their houses (home based) were 30. Since the total number was not enough all who gave verbal consent were interviewed. Women who refused registration, particularly those who were home based were approached three times before being labeled as refusals.

To minimize the number of refusals, the purpose of the study and confidentiality of the results were explained by supervisors who were nurses and health assistants.

Data collection. Interviews were conducted face to face by going house to house and was gender matched after obtaining informed consent. The convenient time for data collection was from 7 am to 8.30 am in the morning, from 12 to 1.30 pm in the afternoon and from 5.30pm to 7 in the evening to get the appropriate study participant. An individual was labeled 'non-respondent 'after being approached three times. For female sex workers the interview was made face-to-face and a male interviewer made the interview. The appropriate time for bar based workers was from 3 pm-5pm. This survey took a total of 25 days

B) Sero survey: To estimate the prevalence of HIV/AIDS infection in the town, a sero survey for HIV 1 infection was done among ANC attendees in Asosa Hospital, Asosa Health center and Bambasi Health center which is located 40 kilometers from the capital city .We used unlinked anonymous methods. All women who came for the purpose of antenatal care from March to May 2001 were selected. The national guidelines for sentinel surveillance for HIV infection recommend to take at least 250 ANC attendee in 3 months.

Data collection instruments.

A standard questionnaire that was designed by Family Health International for Behavioral Surveillance Surveys (BSS) was used to collect information on high-risk behavior for HIV-1 transmission among the adult general population and for female sex workers. The survey questionnaire was translated from English to Amharic and back into English by two different individuals to ensure the two languages were comparable. For ANC attendees socio demographic variables such as age, education, total monthly family income, parity, residency, ethnicity, occupation, and marital status were collected using a different questionnaire (see annex).

Pre testing the questionnaire . The questionnaire was pre tested in a non-randomly selected adult population. These groups were not included in the study. Modification was made of some ambiguous questions.

A) Independent and out come variables for the general population

1)Independent variables: (Explanatory variables)

- Socio demographic variables such as age, gender, marital status, ever attendee & highest level of formal education, religious affiliation, family income, residency duration.
- Proxy-indicator of high-risk behavior such as alcohol intake in the last 4 week, history of drug used such as hashish, khat, tobacco, frequency of traveling out side and staying out of home for more than one month in the past one year.

2)Dependent (Out come variables).

- High-risk behavior such as number of non-regular, commercial partner in the last 12 months and frequency of condom use with them.
- HIV/ AIDS related knowledge on transmission and ways of prevention.
- Knowledge, attitude and experience of voluntary counseling and testing.

- Knowledge of different types of symptoms for sexually transmitted diseases in men and women.
- Self reported symptoms of STIs

B) Independent and out come variable for commercial sex workers

1) Independent variables

- Socio demographic variables such as age, marital status, age at first marriage, ever attendee & highest level of formal education, religious affiliation, number of families or child, total income per client, and whether they were engaged currently in other activities beside commercial sex such as buying and selling.
- Proxy-indicator of high-risk behavior such as alcohol intake in the last 4 week, history of drug used such as hashish, khat, and tobacco.
- Age at first received money for sex.
- Previous experience as a commercial sex worker in other area.

2) Dependent (out come variables).

- Use of condoms with paying and non-paying clients.
- HIV/ AIDS related knowledge on transmission and ways of prevention.
- Knowledge, attitude and experience of voluntary counseling and testing.
- Knowledge of different types of symptoms for sexually transmitted diseases in male and female.
- Self reported symptoms of STIs.

C) Independent and out come variables for ANC attendee: Basic socio demographic variables such as age, marital status, occupation, residency, education, ethnicity, income and obstetrics history i.e. parity were used as independent variables according to the recommendation of WHO in second generation surveillance for HIV.

Biological marker of syphilis and HIV infection were considered as an out come variables. These indicators will serve us for a simple comparison of the characteristics of sentinel site to the behavioral survey conducted in the general adult and FSW populations.

HIV and syphilis laboratory diagnostics.

Trained laboratory technicians collected 10 cc bloods for syphilis and HIV antibody test and labeled the tube with a code number. It was stored at -20 degree centigrade. Test for serological evidence of syphilis was done using commercial rapid plasma regain (RPR), RPR, nosticon II. All manufacturers' protocols were followed.

Part of the serum was stored for 3 months, till adequate number of sample had been collected. By keeping the cold chain, all samples were transferred to ENARP/NRLA for serological test of HIV. Single ELISA, was done using Vironstica HIV uni-form II plus 0 Organon (Teknika Netherlands). A single ELISA is considered sufficient for a prevalence study[7].

Data quality and survey monitoring.

Five field supervisors checked the data collectors. Ten percent of non- randomly selected households were re-visited to check whether the data collectors had visited or not. Every day completed questionnaire was checked for clarity, consistency and completeness. Revisits were done for where errors were detected.

The nurses and the laboratory technician who filled socio-demographic items and collected serum for test were checked daily by the principal investigator to keep the quality of specimens collected in terms of adequacy of volume, transport, storage and clarity of questionnaire.

Data entry and statistical analysis.

Two professional data clerks made the data entry two times (double entry) to maximize data quality. EPIinfo ver 6 and SPSS ver10 were used for binary and logistic regression respectively. Most of the independent variables, and different types of outcome variable are dichotomized and analyzed with ORs and 95 % confidence interval. Associations of socio demographic and outcome variables were analyzed with SPSS to see the relation and to identify confounders. The relation of socio demographic and other explanatory variables with HIV serological status was analyzed by OR with 95 % confidence interval.

Ethical consideration

The study was done after obtaining ethical clearance from the medical faculty of Addis Ababa University. The behavioral survey was done after getting verbal consent from the study participants. Sero survey was conducted after getting approval from the Regional Health Bureau.

Benefit to the study participants and the region.

Participants in ANC clinic were treated for syphilis according to the result. Results of sero and behavioral survey will be used as baseline data for the region for monitoring and evaluation of intervention programs conducted previously and in the near future.

Operational Definitions Of Terms

ANC attendee	pregnant women who came to a health institution (hospital or Health center) for follow up of pregnancy.
Sexual intercourse	Means sexual activity that refers only to penetration of the penis in the vagina, not anal or oral.
Regular partner	This refers to a sexual partner: either a spouse or one has lived together for last 12 months.
Commercial sexual partner	Either male or female who had sex with any opposite sex in exchange for money.
Non-regular partner	partner that the respondents are not married to and have never lived with and didn't pay.
Female sex workers	Female who works in a bar or at home as a sex workers to gain money.
Paying client	Client who paid money (Ethiopian birr) for sexual intercourse.
Non-paying client	partner who don't give money in exchange for sex, including spouse and live-in sexual partner.
VCT	Respondents who voluntarily came for counseling and testing for HIV (with prior information on counseling and testing).
RPR Reactive	positive test samples according to the manufacturer's protocol
RPR non-reactive	Negative test samples on according to the manufacturer's protocols
HIV-1 antibody positive	serum, which gives positive results with single ELISA
HIV-1 antibody negative	Serum that gives negative results in single ELISA

Results

1. Socio Demographic Characteristics

I) General population

From March to April 2001, a total of 883, adults in the general population aged 15-49 years (a response rate of 94 %) were enrolled for behavioral survey. The socio-demographic characteristics are presented in (Table 1). The mean (SD) age was 25.4 (7.1) years. The majority 470 (53.3%) of the participants lived in Asosa for the last 2-10 years and 30 (3.4%) had lived there for one year and less. Very few respondents 13 (1.3%) used to drink alcohol daily and only 9.7% of them weekly. In our survey 129(14.6%) of the participants used to travel in different part of the country and had stayed away from home for more than 30 days in the past 12 months.

II) Female sex workers.

The behavioral survey enrolled 209 of the required 384 female sex workers. Most of them 179(85.6%) worked in bars, or hotel as sex workers. The rest of them were “tella ”and other alcoholic drink sellers. The mean (SD) age of the sex workers was 21.7(4) years and 62 (29.7%) belonged to the age group 15-19 years. More than a third, 70 (33.5%) of female sex workers supported their family or children with mean (median) of 3(2).

2. Marriage and Sexual History

Marriage and sexual history for the general population and female sex workers are depicted in tables 2-4. As low as 10 years of age at first marriage was documented in female sex workers. The mean (SD) age at first marriage for the general population and female sex workers were 18.9(6) and 15.2 (3.6) years respectively, which differed statistically significant [t=4.93; (95 % CI of 2.58-5.08)]. In the general population 27(3%) of married participants were living in polygamous marriage at the time of the survey.

A total of 631 (71.5 %) respondents among the general population had ever had sexual intercourse. More females in the general population had ever had sexual intercourse than males [OR= 1.43; 95 % CI (1.07-1.93)]. The mean (SD) age of the general population at which they initiated sexual intercourse was 18 (3.4) years. Among sexually active respondents of the general population, 527 (84.6%) had sexual intercourse in last the 12 months, 489 (92.7%) had with regular partner, 67 (12.7%) sex in exchange with money and 88 (16.7%) with their non-regular, non-commercial partner. From those who were sexually active in the last 12 months ,12 of them had contact with both non-regular and commercial partners .A total of 6 (50 %) belonged in the age group of 25-34 and 4 (33%)of them belonged in age group of 35 and above. Out of 63 sexually active adults in the age group of 15-19 years of age, 44 (69.8%) had sexual intercourse in the last 12 months, which accounted for 8.3 % of 527. There was a statistical significance difference between men and women in the general population in reporting sexual intercourse in the last 12 months (χ^2 =4.54; p=0.03).

The median number of non-regular, non-commercial partners of sexually active adults in the general population was 2 in last 12 months. Out of 466 male respondents, 12.4 % of them had sexual intercourse with commercial sex workers with mean (median) number of partner 5.2(2).

The mean (SD) age of female sex workers at first sexual intercourse was 16.1(2.6) years & the mean (SD) age at first they had sex in exchange with money was 17.3(4.8) years. A total of 142(67.9%) have had at least one paying client in the last week prior to the survey with mean (median) number of partner 3.0(2), 79(37.8%) of them have had non-paying clients in the last week with mean (median) number of partner of 1.23 (1.0). Out of 105 sex workers who were willing to tell us the number of clients in last the day or night of their work, 65.7% had one and 34.3 % more than one client with mean (median) of 2.1(1). The mean (median) Ethiopian Birr they were paid by last customer was 34.6(30).

Table 1. Socio-demographic characteristics of the study population in Asosa, March 2001.

Variable	General population (n=883) n (%)	Female sex workers (n=209) n (%)
Sex		
Male	466 (52.8)	-------
Female	417 (47.2)	209 (100)
Age (years)		
<15	--------	1 (0.5)
15-24	428 (48.5)	166 (79.4)
25-34	339 (38.4)	42 (20.1)
35-44	100 (11.3)	---
45 +	16 (1.8)	---
Educational level		
Not literate	122 (13.8)	57(27.3)
Elementary	330 (37.4)	85(40.7)
Secondary and above	431 (48.8)	67(32.0)
Religion		
Muslim	188 (21.2)	37(17.7)
Orthodox Christian	517(58.6)	155(74.1)
Other Christian	172(19.5)	15(7.2)
No religion	6(0.7)	2(1.0)
Ethnicity		
Amhara	370 (41.9)	93(44.5)
Oromo	319 (36.1)	92(44.0)
Berta	60 (6.8)	-------
Others	118 (13.4)	17(8.1)
Missed	16 (1.8)	7(3.4)
Occupation		
Daily laborer or unemployed	104 (11.7)	------
Civil servant	152(17.2)	------
Students	210(23.8)	------
Self employed	158(17.9)	-------
Driver or soldier	12 (1.4)	------
House wife	212 (24.0)	------
Un-specified	35 (4.0)	------

Note: 1) 1.8%&3.4%-missed ethnicity is respondent's refusals to notify their ethnic origin in general population and female sex workers respectively.

Table 2. Marriage, sexual history, number & type of partner for the general population in Asosa, March 2001.

Variable	General population Number	Percent
Current marital status (n=883)		
Married.	485	54.9
Never married	321	36.4
Others	77	8.7
Age at first marriage (n=485)		
Less than15 years	40	8.2
15-19 years	171	35.3
20 years and above	186	38.4
Don't recall	88	18.1
Ever had sexual intercourse (n=883)		
Yes	631	71.5
No	243	27.5
Refused to answer	9	1
Age at first sexual intercourse (n=631)		
Less than15 years	38	6.0
15-19 years	328	52
20 years and above	158	25
Don't recall	107	17
Had sexual intercourse in the last 12 months (n=631)		
Yes	527	83.5
No	96	15.2
RA (Refused to answer)	8	1.3
Regular partner in last 12 months (n=527)		
None	38	7.2
One	435	82.5
More than one	16	3.1
Don't remember	38	7.2
Sex in exchange for money in last 12 months (n=527)		
None	352	66.7
One & more	30	5.7
Don't remember number	37	7.0
Refused to answer	108	20.5
Non-Regular partner in last 12 months (n=527)		
None	384	72.9
One& more	22	4.2
Don't remember	66	12.5
Refused to answer	55	10.4

3. Condom use

3.1 General adult population.

From sexually active respondents among the general population i.e. (631), 168(26.6%) have ever used a condom in their lifetime. From 317 sexually active men 125 (39.4%) and from 314 sexually active women 43(13.6%) have ever used a condom. There was a statistically significance difference between men and women in ever use of a condom with [OR = 4.10; 95 % CI=2.72-6.20]. Condom use among the general population with different partners is summarized in table 3. From 527 sexually active respondents in the last 12 months, only 133, (25.2%) have ever used a condom though the difference with ever non-users was not significant ($p > 0.05$). Out of 206 participants in the age group 15-19 years, only 27 (13.1%) have ever used a condom in their life, which accounts for 168(16.1%)of ever users.

Of 489 respondents who had had sexual intercourse with a regular partner in the last 12 months, 395 (80.7%) did not a use condom at the last time of sexual intercourse with their regular partner. The most important reasons mentioned were 180 (28.1%) did not like condom, 41(10.4%) refusal by the partner and 39 (9.9%) did not think it was important. Availability and cost were not mentioned as hindrances for usage.

Out of 67 respondents who had a commercial partner in last 12 months; 65 (97%) used a condom during the last sexual episode with them. The majority (66.2%) of them used by their decision and the rest by partner or decided jointly. Persistent condom use with regular, commercial and non-regular partner is summarized in table 3. Of 58 male respondents who have had sexual intercourse with commercial sex workers in the past 12 months, was only

42(72.4%) of them used a condom every time with those clients though 97% of them used once at the last sexual intercourse.

3.2). Female sex workers.

A total of 185 (88.5%) of female sex workers have ever used a condom in their lifetime. A total of 184(88 %) of commercial sex workers used a condom at the last sexual intercourse. Persistent condom use with paying and non-paying client in the last 30 days is summarized in table 4.

More than 67.4% of the general population and 93.5% of female sex workers could get a condom in less than one hour and the majority of them know from where they could get one.

Table 3. Condom use of the general population with regular, commercial and non-regular partner. Asosa, March 2001.

Variable	Number	Percent
Ever used condom (n=631)		
Yes	168	26.6
No	463	73.4
Ever use condom**		
Male (n=317)	125	39.4
Female (n=125)	43	13.6
Condom use with regular partner last time (n=489)		
Yes	91	18.6
No	395	80.8
RA	3	0.6
Condom use with regular partner in last 12 months (n=489)		
Always	49	10
Not always	39	8.0
Never used	320	65.4
DK &RA	81	16.6
Condom use with CSW last time (n=67)		
Yes	65	97.0
No	2	3.0
Condom use with CSW last 12 months (n=67)		
Always	45	67.2
Not always	19	28.4
Never used	3	4.4
Condom use with non–regular partner last time (n=88)		
Yes	56	63.6
No/DK	32	36.4
Condom use with non-regular partner last 12 months (n=88)		
Always	21	23.9
Not-always	20	22.7
Never	19	21.6
DK and refused to answer	28	31.8

Note

DK: Don't know. RA: Refused to answer, CSW: Commercial sex workers

(Last time of sexual intercourse refers the last episode).

Condom use refers to male condom, ** Significantly more men ever use condom than women with [OR=4.10, 95 %CI=2.72-6.20]

Table 4. Sample characteristics, number, type of sexual partner, and condom use by female sex workers in Asosa, March 2001.

Variable	Number	Percent
Ever married		
Yes	77	36.8
No	132	63.2
Total number of years lived in Asosa		
One year and less	61	29.2
Two–five years	98	46.9
Greater than five years	50	23.9
Worked as sex workers in other places		
Yes	180	86.1
No	29	13.9
Condom use in last 30 days (paying client)		
Always	161	77
Not always	25	12
Never used	19	9.1
Don't remember	4	1.9
Condom use with non-paying client last time (n=77)		
Yes	57	74.0
NO/DK	20	26
Condom use with non-paying client last 12 month (n=77)		
Always	50	64.9
Not always	15	19.5
Never used &Don't remember	12	15.6

Note, n=209 unless mentioned

4. Knowledge on STDs and HIV /AIDS

In the general adult population, 758 (85.8%) have heard about the different types of sexually transmitted disease. Nearly half of them, 476 (53%) didn't mention any of the symptoms in women (lower abdominal pain, offensive and non- offensive genital discharge, ulcers and swelling around the genitalia and pain during urination). Respondents in the general population who correctly mentioned all symptoms of STI in women were 64 (7.2%) and 170 (19.3%) mentioned up to four of the above symptoms. All symptoms of STIs in men such as ulcers, swelling in the genitalia, pain and discharge from the urethra was correctly mentioned by 271 (30.2%) of the respondents and 159(18.1%) mentioned at least one of the above symptoms. The prevalence of self-reported symptoms or sign of sexually transmitted disease in the general population in last 12 months was 2.8%. Out of 883, 19 have had genital discharge and 6 out of 883 had one or more ulcers in the genitalia.

Among female sex workers respondents, 103 (49.2%) didn't mention any of the symptoms of STIs[1] in women and 106 (50.8%) mentioned at least one of the symptoms. All symptoms of STIs in men were correctly identified by 67(32.1%) and 42.1% mentioned at least one of those symptoms at the time of the survey. Self-reported signs or symptoms of STIs among female sex workers in the last 12 months were 8.6%. There was a statistically significance difference in self-reported symptoms of STI between female sex workers and general population. Both vaginal discharge and genital ulcer were more common among female sex

[1] STIs symptoms are lower abdominal pain, offensive and non-offensive genital discharge, pain during urination, ulcer and swelling around the genitalia.

workers [OR=2.4; 95 %CI=1.01-5.47] & [OR=5.9; 95 %CI=1.82-19.3] with respect to the sign.

The disease, HIV/AIDS, is very well known by almost all of the respondents in the general population, 98.6% of them have heard of it. Adequate knowledge on HIV/AIDS prevention and transmission was found among 580(65.7%) of the respondents. In our survey to say an individual had adequate knowledge of HIV/AIDS prevention and transmission, S(he) must know all of the following items: persistent condom use; sexual abstinence ;and having a faithful uninfected partner as ways of prevention of transmission. A statistically significant association was not fond between most of the socio demographic variables and adequate knowledge on HIV transmission except the ethnic category of Tigre, Agew and Gurage, which showed a significant association [OR=3.4; 95 %CI=1.21-9.3]. In the general population, 548 people (62.1%) knew a person who had died of the disease, 41(4.6%) had relatives and 58 (6.5%) close friends who had died of it. Among the general population 387(43.8%) had misconceptions on some form of viral transmission. Educational levels of the respondents were the most important factors associated with these misconceptions. There was more misconception among the illiterate [OR=3.3; 95 %CI=1.8-5.5], followed by those in the primary school category [OR=2.5; 95 %CI=1.7-3.3]. Never married respondents also had more misconceptions compared to other category of marriage with OR=3.3; 95 %CI=1.4-6.2. Knowledge of methods of viral transmission such as sharing sharp objects, maternal to child transmission during pregnancy and through breast-feeding was fairly high i.e.95.8%, 89.8%, and 74.9%, respectively.

All items, which assess adequate knowledge for HIV/AIDS prevention and transmission, were used also in female sex workers. Adequate knowledge on viral transmission was found

in 131(62.7%) of female sex workers, and it had no association with most of the socio demographic variables except with religion. Those who had affiliation to orthodox Christianity lacked adequate knowledge on HIV transmission with OR=0.2; 95%CI=0.03-0.80. Misconception on HIV transmission was found in 124 (59.3%) female sex worker, and educational level played an important role i.e. Misconception was more common in illiterate [OR=3.2; 95 %CI=1.4-7.1]. In female sex workers 129 (61.7%) of them had close friends and 18(8.6 %) had a relative who had died of the disease. Among FSW knowledge of HIV transmission thorough sharing needles, maternal to child transmission during pregnancy and breast-feeding was 197 (94.2%), 188(89.4%) and 143 (68.4%), respectively.

A statistically significance difference was found in some of the items, when HIV/AIDS transmission and prevention knowledge was compared between the general population and female sex workers**.** Use of condoms as an effective way of prevention was better known by female sex workers than the general population, (OR=3.21; 95 % CI=1.8-5.8). But these FSW failed to reject mosquito bite as methods of viral transmission (OR =1.89; 95 % CI=1.4-2.6). On the other hand, the role of an uninfected faithful partner in prevention was better known by the general population as compared to commercial sex workers (OR=3.8; 95 %CI=2.4-6.0).

5) Knowledge, attitude and experience for VCT

5.1) General population

A total of 249 (28.2%) of the respondents stated that voluntary counseling and testing services were available in Asosa. It was only 34(3.9%), who had ever had an HIV test in the

past. A total of 224 (25.4%) of the respondents were willing to give blood for an HIV test if they were approached and counseled by a physician and 128(14.5%) said they would have it if their partner asked. More than a third of the respondents had not considered HIV testing and counseling .On the other hand 139(15.7%) said they would never ask for the above services due to unspecified reasons. Provision of HIV testing and counseling to married couples was accepted by 89.2% of the respondents and 84.5% of them supported the provision of these services to pregnant women. Never married individuals [OR=0.45;(95 % CI=0.24-0.89) and participants who had lived 11 years and above in Asosa [OR=0.68; 95 %=0.48-0.97] had negative attitude towards HIV testing as compared to other categories in multi variate analysis. The ethnic category of Berta had positive towards VCT [OR= 1.99; 95 %CI =1.06-3.75].

5.2) Female sex workers

In female sex workers it was found out that 124 (59.3%) had not considered taking voluntary HIV testing and counseling. Duration of residency, adequate knowledge on viral transmission and ethnic category were significant on bivarate analysis for being acceptors of HIV test. After controlling for possible confounders such as age, educational status, religions, ethnicity, being ever married and misconception on viral transmission, FSW who lived in Asosa 6 years and more were willing to undergo VCT (OR=2.3; 95%CI =1.1-5.0). Similarly those who had adequate knowledge on viral transmission were willing to have VCT (OR=2.3; 95 %CI= 1.2-4.5).

There was a statistical significant difference between female sex workers and the general population in having undergoing a previous HIV test [OR=4.5; 95%CI=2.54-7.8].

6 Perceived susceptibility

Participants attitude of perceiving themselves to be susceptible to the virus was assessed by the item of " Do you feel at risk of acquiring HIV infection " as a result of current /past high-risk behaviors. A total of 421 (47.6%) of the general population were aware of being engaged in high-risk practices, which expose them to the disease. Being female [OR= 1.5; 95 %CI=1.02-2.10] and individuals who had a positive attitude to take VCT test [OR=1.60; 95 %CI=1.2-2.2] felt themselves more at risk in multi variate analysis by controlling possible socio demographic confounders.

Participants who never had sexual intercourse [OR=0.45; 95 %CI=0.28-0.74] , those who didn't have adequate knowledge of HIV/AIDS transmission [OR=0.7; 95 %CI=0.53-0.91] and those who had been in Asosa for eleven years and more[OR=0.65;95 %CI=0.5-0.89] considered themselves at low risk (Table 6).

From the total of 209 FSW, 145(69.4%) perceived themselves as being at high-risk of acquiring the virus. FSW who were illiterate perceived 2.11 times at risk to other category of education, with 95 %CI, 1.01-4.42. By controlling for possible confounders such as age, educational status, religion, ethnicity, ever married and total years of staying in Asosa in multivariate analysis, people of non-Amhara and Oromo ethnicity still felt at low risk with OR (95 % CI) of 0.26 (0.08-0.83). Female sex workers felt themselves more at risk than the general population [OR=2.70; 95 %CI = 1.94-3.91].

Table 5. Factors associated with willingness for voluntary counseling and testing in the general population, Asosa, March 2001

Variable	Willingness for VCT		OR, 95 % CI	OR 95 % CI adjusted
	Yes n (%)	No n (%)		
Sex				
Male	198(57.5)	268(42.5)	1	1
Female	165(39.6)	252(60.4)	0.89(0.67,1.17)	1.10(0.66,1.71)
Age (years)				
15-24	186943.5)	242(56.5)	1	1
25-34	141(41.6)	198(58.4)	0.93(0.96,1.25)	1.21(0.68,2.20)
35 & above	36(31.0)	80(69.0)	0.59(0.37,0.93)*	1.56(0.95,2.60)
Marital status				
Married	170(35.1)	315(64.9)	1	1
Never married	149(46.7)	170(533)	1.62(1.20,2.19)*	0.46(0.24,0.89)*
Others	44(55.7)	35(44.3)	2.33(1.40,3.88)*	1.00(0.49,2.10)
Education				
Secondary & above	193(44.8)	238(55.2)	1	1
Elementary	132(40)	198(60)	0.82(0.61,1.11)	0.98(0.64,1.51)
Not literate	38(31.1)	84(68.9)	0.56(0.36,0.87)*	0.71(0.40,1.23)
Religion (n=877)				
Muslim	65(34.6)	123(65.4)	1	1
Orthodox Christian	230(44.3)	287(55.5)	1.52(1.06,2.18)*	1.04(0.60,1.90)
Other Christian	68(39.5)	104(60.5)	1.24(0.79,1.94)	1.25(0.78,2.00)
Ethnicity (n=867)				
Amhara	161(43.5)	209(56.5)	1	1
Oromo	137(42.9)	182(57.1)	0.98(0.71,1.34)	1.76(0.97,3.23)
Berta	18(30.0)	42(70.0)	0.56(0.30,1.04)	1.99(1.06,3.73)*
Others	41(34.7)	77(65.3)	0.69(0.44,1.09)	1.38(0.54,3.52)
Occupation				
Daily laborer or unemployed	47(45.2)	57(54.80	1	1
Civil servant	58(38.2)	94(61.8)	0.75(0.44,1.28)	2.13(0.73,6.18)
Student	97(46.2)	113(53.8)	1.04(0.60,1.72)	1.55(0.57,5.23)
Self employed	72(45.6)	86(54.4)	1.02(0.60,1.72)	2.14(0.71,6.48)
Driver or soldier	3(25)	9(75)	0.40(0.08,1.77)	2.47(0.92,6.63)
House wife	76935.8)	136(64.2)	6.86(4.38,10.8)*	0.94(0.15,5.80)
Unspecified	10(28.6)	2571.4)	0.49(0.19,1.19)	1.98(0.69,5.62)
Duration of residency				
One year and less	11(36.7)	19(63.3)	1	1
2-10 years	182(38.6)	289(61.4)	1.09(0.48,2.50)	0.97(0.33,2.83)
11 years & above	170(44.5)	212(55.5)	1.39(0.61,3.20)	0.68(0.48,0.97)*

Table 5 continued

Variable	Willingness for VCT		OR, 95 % CI	OR 95 % CI adjusted
	Positive n (%)	Negative n (%)		
Ever had sex				
Yes	249(39.5)	382(60.5)	1	1
No	114(45.2)	138(54.8)	1.27(0.93,1.72)	0.50(0.15,1.58)
Had sexual intercourse with any partner in last 12 months (n=623)				
Yes	205(38.9)	322(61.1)	1	1
No	40(41.7)	56(58.3)	1.12(0.70,1.79)	1.27(0.74,2.16)

Note * p value < 0.05, total n=883 unless specified,

OR adjusted for sex, age, marital status, education, religion, ethnicity, occupation, total years of residency, sex in last 12 months.

Table 6. Determinants of perceived susceptibility to HIV /AIDS for the general population, Asosa, March 2001.

Variable	Perceived susceptibility for HIV/AIDS		OR, 95 % CI	OR 95 % CI adjusted
	Yes n (%)	No n (%)		
Sex				
Male	218(46.8)	248(53.2)	1	1
Female	203(48.7)	214(51.3)	1.08 (0.82,1.42)	1.46(1.02, 2.10)*
Age (years)				
15-24	211(49.3)	217(50.7)	1	1
25-34	158(46.6)	181(53.4)	0.90 (0.67,1.21)	0.99(0.60,1.65)
+35	52(44.8)	64(55.2)	0.84(0.54,1.29)	0.98(0.62,1.56)
Education				
Secondary and above	215(49.9)	216(50.1)	1	1
Elementary	157(47.6)	173(52.4)	0.91(0.68,1.23)	0.98(0.69,1.37)
Not literate	49(40.2)	73(59.8)	0.67 (0.44,1.03)	1.26(0.78,2.06)
Current marital status	221(45.6)	264(54.4)	1	1
Married.	158(49.5)	161(50.5)	1.17 (0.87,1.57)	1.15(0.65,2.10)
Never married	42(53.2)	37(46.8)	1.36(0.82,2.24)	0.77(0.44,1.40)
Others				
Ever had sex				
Yes	312(49.4)	319(50.6)	1	1
No	109(43.3)	143(56.7)	0.78(0.57, 1.05)	0.45(0.28,0.74)*
Duration of residency				
One year and less	13(43.3)	17(56.7)	1	1
2-10 years	243(51.6)	228(48.4)	1.39(0.63,3.12)	0.92(0.41,2.0)
Eleven years & above	165(43.2)	217(56.8)	0.99(0.44,2.24)	0.65(0.5,0.89)**
Occupation				
Daily laborer or unemployed	44(42.3)	60(57.7)	1	1
Civil servant	70(46.1)	82(53.9)	1.16(0.68,1.99)	1.15(0.49,2.72)
Student	108(51.4)	102(48.6)	1.44(0.87,2.39)	1.10(0.47,2.44)
Self employed	83(52.5)	75(47.5)	1.51(0.89,2.56)	0.65(0.28,1.51)
Driver or soldiers	8(66.7)	4(33.3)	2.73(0.68,11.6)	0.71(0.31,1.61)
House wife	94(44.3)	118(55.7)	1.09(0.66,1.79)	0.31(0.10,1.15)
Unspecified	14(40.0)	21(66.0)	0.91(0.40,2.12)	1.28(0.54,3.0)
Religion (n=877)				
Muslim	82(43.6)	106(56.4)	1	1
Orthodox Christian	266(51.5)	251(48.5)	1.37(0.97,1.94)	0.91(0.54,1.54)
Other Christian	70(40.7)	102(59.3)	0.89(0.57,1.38)	0.71(0.47,1.10)

Table 6. Continued

Variable	Perceived susceptibility for HIV/AIDS		OR, 95 % CI	OR 95 % CI adjusted
	Yes n (%)	No n (%)		
Ethnicity (n=867)				
Amhara	187(50.5)	183(49.5)	1	1
Oromo	146(45.8)	173(54.2)	0.83(0.60,1.34)	0.87(0.56,1.4)
Berta	25(41.7)	35(58.3)	0.7(0.39,1.20)	0.87(0.54,1.41)
Others	56(47.5)	62(52.5)	0.88(0.57,1.37)	0.82(0.40,1.70)
Attitude for HIV test				
Will Request	199(54.8)	164(45.2)	1.63(1.24,2.13)*	1.60(1.20,2.2)***
Never request	222(42.7)	298(57.3)	1	1
Have correct HIV knowledge				
Yes	252(50.9)	305(54.8)	1.0	1
NO	169(51.8)	157(48.2)	1.3(0.98, 1.73)	0.71(0.53,0.91)*
Reject all misconception	252(50.9)	243(49.1)	1	1
Yes	169(43.6)	219(56.4)	1.34(1.03,1.80)*	1.24(0.91,1.67)
NO				

Note: p value<0.05, **<0.01, ***<0.001, Total n=883 unless specified*

OR adjusted for socio-demographic variables, ever had sex, attitude for HIV test and knowledge on HIV transmission.

7**) Socio-demography and Prevalence of HIV and Syphilis infection**

The unlinked anonymous sentinel surveillance for HIV in pregnant mothers started in Asossa Hospital on 3 March 2001 and was completed on 25 May 2001. Due to lower than expected number of ANC attending women, surveillance was expanded to Asossa and Bambasi health center (started: 7 and 8 May 2001, and completed on 25 and 24 May 2001, respectively).

Asossa health center is located approximately 2 km away from Asossa hospital; the facility is serving both residents from rural and urban areas. Bambasi health center is 40 km away from Asossa town and located in a rural settlement. During the surveillance period 283 women attended to ANC services; 202 to Asossa hospital, 39 to Asossa health centre and 42 to Bambasi health centre.

Plasma was separated from the collected blood sample and separated in two nunc tubes; one stored for transportation and HIV testing at the Ethio-Netherlands AIDS Research Project at the Ethiopian Health and Nutrition Research Institute in Addis Ababa; the other used to determine syphilis infection by RPR test in the Asossa hospital laboratory. Thirteen women (4.6%) tested positive and received appropriate treatment against syphilis.

Of 283, 49 or 17.3% tested positive for HIV (single ELISA, see methods). Twenty-two women were excluded from further analysis for the following reasons: on a particular day an unusual high number (22) of pregnant women attended to ANC services; 12 of these were positive for HIV. The fact that these 12 HIV positive women presented consecutively in addition to the

unusual high number compared to previous days made the investigators suspect of either a laboratory error, or a selection bias (i.e. a group of women that decided to attend to ANC services that day). Therefore, we report on 261 ANC attending women; 180 attended to Asossa Hospital, 39 to Asossa health centre and 42 to Bambasi health centre, respectively.

The overall prevalence of HIV was 16.1% (29/180) in Asossa Hospital, 15.4% (6/39) in Asossa health centre, and 7.1% (3/42) in Bambasi health centre. Interestingly, based on the pregnant mother's residence categorized as 'Asossa town' or 'outside Asossa town', urban HIV prevalence (both Asosa hospital and health centre) was 19.3% (34/176) and rural HIV prevalence was 2.3% (1/43) (23 and 19 women from rural areas attended to the hospital and health centre, respectively). HIV prevalence at Bambasi health centre was 7.1% (3/42). The latter two were grouped.[2]

Comparison of study characteristics of the urban and rural populations is shown in table 7. Urban HIV prevalence was 4.85 times (95% confidence interval 1.57-16.73) higher than in rural areas. HIV was high in all urban age groups, with highest HIV prevalence in pregnant mothers of 15-19 years of age. In multivariate analysis only low income (< 100 Birr) was significantly associated with HIV, albeit number of cases is small.

[2](There was one missing residency registration in the raw data, which makes total of 84, instead of 85)

Table 7. Comparison of characteristics in terms of HIV serological status, urban residency (Asosa town) and rural residency (outside of Asosa town and from Bambasi), 2001.

Characteristic				
	Urban (n) HIV positives (%)	**Total**	**Rural (n) HIV Positives (%)**	**Total**
Total	34 (19.3)	176	4 (4.7%)	85
Age (years)				
15-19	7 (25)	28	0 (0)	13
20-24	10 (14.5)	69	3 (0.1)	33
25-29	11 (21.2)	52	0 (0)	22
+30	6 (22.2)	27	1 (5.9)	17
Educational status				
Illiterate	2 (14.3)	14	0	28
Literate	32 (19.8)	162	4 (7.0)	57
Parity				
Nulli	9 (15.5)	58	2 (18.2)	11
Primi	11 (20.4)	54	2 (7.4)	27
Two and above	14 (23)	61	0	45
Income				
Less than 100 birr	3 (42.9)*	7	1 (3.3)	30
101-500 birr	14 (16.5)	85	3 (7.0)	43
Above 500 birr	17 (20.2)	84	0	12
Ethnicity				
Oromo	11 (17.5)	63	1 (2.6)	39
Amhara	16 (26.2)	61	3 (9.1)	33
Berta	3 (20.0)	15	0	1
Others	4 (10.8)	37	0	12
Occupation				
House wife	28 (19.4)	144	4 (5.3)	76
Others	6 (18.8)	32	0	9

* p value < 0.01 in multivariate logistic regression

Discussion

This is one of the few studies in Ethiopia, which tries to assess behavioral and biological indicators in different groups of population according to the recommendation of second generation surveillance for HIV /AIDS by WHO/UNAIDS .The Prevalence of HIV infection among antenatal clinic attendees provides that an urgent response is required to address prevalent high -risk behavior. Human behavior that predisposes people to acquire and transmit the virus was assessed. Both high-risk groups of the population i.e. commercial sex workers and representative samples of the adult general population were included to assess prevalent high-risk practice across them. Use of standard questionnaires, training and pretesting the instrument make the results internally valid. Taking a large sample size from the general population will make the finding valid externally which helps us to generalize the findings to the whole population especially in Asosa town.

Uganda and Thailand used behavioral surveys as evidence to prove that the reduction of HIV/AIDS prevalence in the past couple of years was a result of change in high-risk human behaviors gained some years earlier by a strong social mobilization and prevention campaign. [8-11] For effective prevention and handling of the epidemic, definitive and concrete knowledge on various ways of viral transmission and rejecting prevalent mis conception is crucial. The association of HIV/AIDS prevention, transmission and misconception knowledge with some social and economic indicators is analyzed in the survey.

Assessment of high-risk behaviors in Ethiopia was initiated in the 1990s [24-28]. High scores especially in knowledge of modes of viral transmission were documented which showed some success in raising awareness both in the general population and sub groups of it. [24-28,32,35].

Adequate knowledge on viral transmission and prevention is believed to be a key factor in fighting the epidemic .In our survey peoples' awareness of asymptomatic healthy carriers was low and misconceptions such as mosquito bite, as a vehicle for viral transmission was common. Adequate knowledge on viral transmission by itself is of no use if the individual does not know that they can get infection from an asymptomatic carrier who looks well and healthy. A statistically significantly difference was found in some of the items, which assessed knowledge among female sex workers and the general, population. This reminds us to address specific health education methods to specific population groups.

The survey did not detect a statistically significance difference between most of the socio demographic variables and adequate HIV prevention knowledge both in the general population and commercial sex workers. The only variable that showed significance in multi variate analysis is education. Being illiterate was a risk factor for lack of knowledge of preventive methods. This is comparable to a review made by Peruge and Celentano in the general population and adolescents [45]. An increase in educational level increased AIDS knowledge but other socio demographic such as age, gender, marital status, race, income and religious conviction were not statistically related to AIDS knowledge .The authors further explained that a low level of AIDS knowledge tended to be associated with a higher level of concern. People from the general population who had inadequate HIV knowledge on transmission or prevention had a low level of concern or felt themselves at low risk. Sufficient and knowledge is important to change high-risk behavior, because people who have high level of concern tend to change their behavior early.

Level of education plays a vital role both in the general population and commercial sex workers related to common misconceptions. Misconceptions were more common among the illiterate and those with only an elementary level of education than those who were in secondary school and

above. From this survey we can say that raising educational levels is a key tool in fighting the epidemic and we recommend providing access to education for women in general and for marginalized groups such as sex workers in particular.

Self-reported symptoms of STI such as genital ulcer and discharge were significantly more common in female sex workers than the general population. We were expecting much higher rates of STI in both groups; one reason is that more than 50 % of the respondents in the general population failed to mention at least one symptom of STI in women and only 7.2% mentioned all symptoms. The asymptomatic nature of most STIs could make the reported figure lower. This low level of awareness and under reporting is a great challenge in reducing the incidence and prevalence of STI including HIV/AIDS .The first task in overcoming this problem would be to allocate additional resources to raise people's knowledge of symptoms of sexually transmitted disease and to encourage them to take investigation and treatment. The next steps would be to promote prevention methods such as condom use or sexual abstinence until they get faithful partner.

The prevalence of HIV infection in our survey was high and comparable to most studies in Africa, in which the prevalence exceeds 30 % in pregnant women .[5] Among HIV positive women, 57.2% belong to the age group of 15-24 years which is very similar to the current world situation in which half of new HIV infections occur in people under the age of 25 .[2-4] But it is uncommon for Ethiopian situation.

In our survey, sero status results have not been found to be statistically significant different in different age category, marital status and parity. This is most probably due to recent infection in the area. With longer duration of infection women become less fertile and thus less likely to be present at an antenatal clinic. The other explanation is that due to the nature of unlinked

anonymous study, which minimizes selection bias, or due to the small sample size enrolled in the survey.

Reports from an ANC clinic may give misleading results when applied to the whole population. This may over estimate the prevalence in the younger age groups of the general population. By taking all of the limitations into consideration, the information from Asosa will contribute to activities regarding HIV/AIDS intervention to be started.

Even though a sero survey was not conducted in the general population or among female sex workers, we expect high prevalence due to prevalent risky behavior, low level of awareness of HIV/AIDS and STI and prevalent misconceptions.

Female sex workers felt more at risk than the general population. Among the general population women perceive themselves more at risk than men [OR=1.5; 95 %CI=1.02-2.10]. Perceived susceptibility is another important indicators for effective intervention. This is because people who perceive themselves a susceptible to a disease tend to change their behavior earlier. Similarly, respondents who have positive attitudes towards a HIV test had concern and felt at risk. These types of awareness will help us to expand the VCT service in an area so that people will change their risky behavior .One study among ANC attendees in Atlanta showed that VCT acceptors have more concern than refusers .[59]

The availability of voluntary counseling and testing services for HIV in Asosa was not known by more than 70 % of the general population. Many studies in Africa showed that that VCT as important tools for behavioral change.[13-15,68] In our survey we found a very low level of acceptance for testing and a low proportion of people ever tested. Different socio demographic indicators of attitude for VCT in the survey revealed that never married respondents and people who had been in Asosa for eleven years and more had negative attitude towards service.

Therefore, our findings direct us to invest resource and finance to increase and attract more people for testing. This might be explained by low level of awareness across the general population of the benefit of counseling and testing or because people consider that they will not benefit because of the absence of treatment which delays death and drugs which reduces maternal to child transmission. Further studies using qualitative methods targeting religious leaders, regional officials, and opinion leaders are required to find out barriers to testing. The role of health care providers in encouraging or discouraging counseling and testing is also a potential area of research in expanding the services and in increasing the acceptance rate for testing. It has been shown that the acceptance rate of VCT may range from 35 to 100% in previous studies [54,56-60]. For example a 54% request rate for VCT was reported in an antenatal setting in Nairobi [19], and 37 % initial willingness with 9.3% actual acceptance in a community study in Zambia was documented [64]. A total of 344 (39 %) were willing to have an HIV test if they were informed or requested by physician or their sexual partner. These findings give crucial information to health professionals to extend the service in health institutions. Even though the survey did not determine the actual acceptance rate, it would be very low similar to other study sites of Africa or developed nations.

At the end, HIV /AIDS infection in Asosa is at the stage of a generalized epidemic, and people are engaged in risky behavior, with low levels of awareness of prevention.

Strengths of the study

1) The study assessed behavioral and biological markers for HIV infection using standard survey instruments, which will create trend analysis in the future.

2) Both high and low risk groups of the population were involved in the survey. This enabled us to compare prevalent high-risk behavior across them.

3) Socio demographic characteristics such as income, parity and educational status were collected from ANC attendees according to the recommendation of WHO/UNAIDS, and HIV test results remained confidential. This enabled as to compare trends across themselves and with the prevalence of HIV infection in the general population in the near future.

4) The large sample size in the general population increased the external validity of the results and permitted generalization to the whole population in Asosa town.

Limitations of the study

1) Social desirability bias due to sensitive and personal questions related to sexuality.
2) Qualitative methods were not used which could have enabled us to find out relevant and important items which the respondents in the quantitative survey refused.
3) Insufficient sample size in female sex workers and the possibility of selection bias.
4) Possible influx of pregnant commercial sex workers to ANC services.

Conclusion

1. High-risk sexual behavior was common both in the general population and among female sex workers. Persistent use of condoms during sexual intercourse was very rare in both groups.

2. Knowledge of HIV/AIDS prevention and transmission was low in both groups. On the other hand misconceptions about transmission of the infection were common.

3. A very small proportion of respondents mentioned or identified all signs or symptoms of STIs. This might contribute to the progression of the infection.

4. Risk perception was higher in women sex workers than the general population. Among the general population, female felt more at risk than men. This might help us to design and implement effective preventive methods such as 100% condom usage.

5. Peoples' awareness of the availability of voluntary counseling and testing was low. Never married and those who were in the area for a long time had negative attitudes towards the service.

6. HIV-1 prevalence in Asosa town was high, only income had statistically significant association with HIV status. The prevalence out side Asosa town was low (4.7%).

Recommendations

1.Establishment of an extensive health education program to raise the level of HIV knowledge such as the means of transmission, prevention and on some form of wrong beliefs, particularly the possibility of a healthy looking man as a potential carrier of the virus.

2.In generalized types of epidemic, even if HIV infection is well established in the general population, sub populations such as female sex workers with high-risk behavior will contribute disproportionately to the continued spread, therefore cross-sectional surveys of behavior and HIV sero status on an annual basis are recommended to document changes in the most common high-risk behaviors.

3.To focus on at ANC clinic as sentinel site for sero survey and to increase younger age groups will help us to document trends in recent infection.

4.Encouraging the wider use of second-generation sentinel surveillance system guidelines in the future. This will enable us to compare biological and behavioral survey results (i.e. collect basic population characteristics in ANC clinic).

5.Repeat behavioral cross sectional survey at household level in the general population for tracking changes in sexual behavior. These types of survey might be conducted every three to five years.

6. To conduct a behavioral survey among young people to document high-risk behavior and to establish safer behavior. This is much more effective than changing behavior among older people. Therefore this type of survey might be conducted every two years. This is due to the rapid nature of behavioral change in these groups.

7.Establishing a 100 % condom promotion and utilization program for FSW. Health workers, volunteers or peer educators from female sex workers can implement this.

8.To encourage opinion leaders, religious leaders and health professionals to expand VCT services in the area and to attract more people to use the service.

9. To identify economic alternatives for FSW such as small-scale micro finance projects to shift from their high -risk works.

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Annex.1 English Questionnaire.

Behavioral survey Questionnaire for HIV/AIDS infection in Asosa town, Benishangul Gumuz Regional state.

Consent form.

001. Questioner Identification Number /--------/-------/

002 City Asosa

003 Regions: Benishangul –Gumuz

004 Sites: Kebeles 01-04

Introduction: My name is ----------; I am working as data collector in a survey conducted by the collaboration of regional health bureau and Addis –Ababa University medical faculty, department of community health to find out high-risk behavior in people, which predispose them to acquire HIV infection. Have you been interviewed in the past few weeks? If you have it, you will not be interviewed, other wise I kindly request you to participate in the survey.

I am going to ask you some very personal questions that some people find difficult to answer. Your answers are completely confidential. Your name will not be written on this form and will never be used in connection with any information you tell me. You don't have to answer any questions that you don't want to answer and you may end this interview at any time you want to. However, your honest answers to these questions will help us better understand what people think, say and do about certain kinds of behaviors. We would greatly appreciate your help in responding to this survey. The survey will take about 30-45 minutes to ask the questions. Would you be willing to participate?

Signature of interviewer certifying that informed consent has been given verbally by respondent.

Interviewer visit

	Visit 1	Visit 2	Visit 3
Date			
Interviewer			
Result			

Result codes: completed 1, respondent not available 2,Refused 3, partially completed 4, Other 5.

005Interviewer: code [-------/--------] name _____

006 Date in interview: ----------/------------

Checked by Supervisor: Signature_____ date _____

Section 1: Background characteristics.

No	**Questions and filters**	**Coding categories**		**Skip to**
101	Record sex of the respondent	Male Female	1 2	
102	In what month and year were you born?	Month [----------] Don't know month No response Year [----------] Don't know year No response	 88 99 88 99	
103	How old were you at your last birthday? (Compare and correct with q102 if needed)	Age in completed years [------] Don't know No response	 88 99	
104	Have you ever attend school?	Yes No No response	1 2 9	→107
105	What is the highest level of education you completed? Circle one	Only read and write Grade 1-6 Grade 7-10 Grade 11-12 Above grade 12 No response	1 2 3 4 5 9	
106	How many total years of education have you completed up to now?	Years completed [-----/----] No Response	 99	
107	How long have you lived here in Asosa town?	Number of years [-----/---] Record 00 if less than 1 year Don't know No response	 88 99	
108	In the last 12 months have you been away from your home for more than one month altogether?	Yes No Don't know No response	1 2 8 9	
109	What religion are you? **Circle one**	Muslim Orthodox Christian Protestant Catholic Other religion (specify)---------- - No religion No Response	1 2 3 4 0 9	
110	To which ethnic groups do	Amhara	1	

	you belong? **Circle one**	Oromo Tigrie Garage Berta Agew Other (specify)---------- No response	2 3 4 5 6 9	
111	During the last 4 weeks how often have you had drinks containing alcohol? Would you say -------read. **Circle one**	Every day At least once a week Less than once a week Don't know No response	1 2 3 8 9	
112	Some people have tried rang of different drugs. Which of the following, if any, have you tried? Read list	Yes No DK NR Hashish 1 2 8 9 Kat 1 2 8 9 Tobacco 1 2 8 9		
113	Some people have tried injecting drugs using a syringe. Have you injected drugs in last 12 months? **Drugs injected for medical purposes or treatment of an illness don't count**	Yes No Don't know No Response	1 2 8 9	
114	What is your occupation?	Job less Daily laborer Government employee Student Merchant Soldier (current) Driver House wife Other (specify)---------- No Response	1 2 3 4 5 6 7 8 99	
115	Joint family income per months	Eth birr [----------] Dependent on others Don't Know No Response	 00 88 99	

Section 2: Marriage and live in partnerships.

201	Have ever been married	Yes No No Response	1 2 9	→203

202	How old were when you first married?	Age in years [------/------] Don't know No Response	 88 99	
203	Are you currently married or living with a man /women with whom you have a sexual relationship?	Currently married, living with spouse Currently married, living with other sexual partner Currently married, not living with spouse or any other sexual partner. Not married, living with sexual partner Not married, not living with sexual partner. No response.	1 2 3 4 5 9	 →301 →301

204	If married Men: do you have more than one wife? Women: Does your husband have other wives?	Yes No No response	1 2 9	
205	Currently if you are not married, your marital status is?	Partner died Divorce Separated Never married No response	1 2 3 4 9	

Section 3: Sexual history: number and types of partners

301	Have you ever had sexual intercourse? [For the purpose of this survey it considers only vaginal sex)	Yes No No response	1 2 9	 →703
302	At what age did you first have sexual intercourse?	Age in years [------/------] Don't know No Response	 88 99	
303	Have you had sexual	Yes	1	

	intercourse in last 12 months?	No No response	2 9	→702
304	For women Think about the male sexual partners you have had in the last 12 months For men Think about the female sexual partner you have had in the last 12 months How many were: -Your spouse(s) or live in sexual; partner (**regular partner**) -**Commercial (**partners with whom you had sex in exchange for money) -Sexual partner that you are not married to and have never lived with and didn't pay (**non-regular partner)**	**Regular** [----/----] Don't Know No response **Commercial** [----/----] Don't Know No response **Non-regular** [---/-----] Don't Know No response	 88 99 88 99 88 99	

Section 4: sexual history: Regular partner.

401	Filter check 304 Had sex with regular partner during past 12 months [if yes] ↓	Didn't have sex with regular partner during past 12 months [_____]	501	
402	Think about your most recent	Number of times [_____/____]		

	regular sexual partner. How money times did you have sexual intercourse with this person over the last 30 days? (**Regular partner includes spouse or live in sexual partner)**	Don't Know No response	88 99	
403	The last time you had sex with regular partner, did you and your partner use a condom?	Yes No Don't Know No response	1 2 8 9	 →405 →406
404	Who suggested condom u se that time? **Circle one**	Myself My partner Joint decision Don't Know No response	1 2 3 8 9	→406 →406 →406 →406
405	Why didn't you and your partner use a condom that time? **Circle all answers mentioned**	Yes No Not available 1 2 Too expensive 1 2 Partner objected 1 2 Don't like them 1 2 Used other contraceptive 1 2 Didn't think it was necessary 1 2 Didn't think of it 1 2 Other (mention)---- 1 2 ----- 1 2 Don't Know No response		
406	With what frequency did you and all of your regular partner(s) use condom during the past 12 months?	Every time Almost every time Sometimes Never Don't Know No response	1 2 3 4 8 9	

Section 5: Sexual history: commercial partner:

501	Filter check 304 Had sexual intercourse with commercial partner in last 12 months [___yes_____]	Has not had sexual intercourse with a commercial partner in last 12 months[---] →	601	
502	Think about your most recent commercial sexual partner. How many times did you have sexual intercourse with this person over the last 30 days?	Number of times [_____] Don't Know No response	 88 99	
503	The last time you had sex with commercial partner did you and partner use a condom?	Yes No Don't Know No response	1 2 8 9	 →505 →506
504	Who suggested condom use that time? **<u>Circle one</u>**	Myself My partner Joint decision Don't Know No response	1 2 3 8 9	→506 →506 →506 →506
505	Why didn't you and your partner use a condom that time? **Circle all answers mentioned**	Yes / No Not available 1 2 Too expensive 1 2 Partner objected 1 2 Don't like them 1 2 Used other contraceptive 1 2 Didn't think it was necessary 1 2 Didn't think of it 1 2 Other (mention)---------- 1 2 --- 1 2 Don't Know 1 2 No response		
506	With what frequency did you and all of your commercial partner(s) use condom during the past 12 months?	Every time Almost every time Sometimes Never Don't Know	1 2 3 4 8	

		No response	9	

Section 6: sexual history: non-regular, non-commercial sexual partners.

601	Filter: check 304 Had non-regular non commercial sex partner during in last 12 months…[yes] ▼	Did not have non-regular non-commercial sex partner during last 12 months[_____]	→	701
602	Think about your most recent non-regular, non-commercial sexual partner. How many times did you have sexual intercourse with this person over the last 30 days ?	Number of times [___/___] Don't Know No response	 88 99	
603	The last time you had sex with non-regular, non-commercial partner did you and your partner use a condom?	Yes No Don't Know No response	1 2 8 9	 →605 →606
604	Who suggested condom use that time? **<u>Circle one</u>**	Myself My partner Joint decision Don't Know No response	1 2 3 8 9	→606 →606 →606 →606

605	Why didn't you and your partner use a condom that time		Yes	No	
		Not available	1	2	
		Too expensive	1	2	
		Partner objected	1	2	
		Don't like them	1	2	
		Used other contraceptive	1	2	
		Didn't think it was necessary	1	2	
		Didn't think of it	1	2	
		Other (mention)----------	1	2	
		---	1		
		Don't Know			
		No response			
606	With what frequency did you and all of your non-regular, non -commercial (s) use condom during the past 12 months?	Every time		1	
		Almost every time		2	
		Sometimes		3	
		Never		4	
		Don't Know		8	
		No response		9	

Section 7: male condom

701	Filter: see Q 403,406,503,506,603,606 Condos not used…[____]	Condom used →		704
702	Have you and a sexual partner ever used a male condom?	Yes	1	→ 704
		No	2	
		Don't know	8	

	(Show picture or sample of one)	No response	9	
703	Have you ever heard of a male condom?(show picture or sample of one)	Yes No Don't know No response	1 2 8 9	 → 801 → 801
704	Do you know of any place or person, which you can obtain male condom?	Yes No No response	1 2 9	 → 707
705	Which places or person do you know where you can obtain male condom? **<u>Probe and record all</u>** **<u>answers</u>**	Yes / No Shop 1 / 2 Pharmacy 1 / 2 Market 1 / 2 Clinic 1 / 2 Hospital 1 / 2 Family planning 1 / 2 center 1 / 2 Bar /guest 1 / 2 house/hotel/ 1 / 2 Peer educator 1 / 2 Friend 1 / 2 Other ---------- - No response		
706	How long would it take you to obtain a male condom close to your house or to where you work?	Under one hour 1 hour to one day More than one day Don't know No response	1 2 3 8 9	
707	For sexually active respondents only: During the past 12 months, did you ever have sexual intercourse with out using a condom with any commercial sexual partner or any other sexual partner who you have never lived with and are not married to?	Yes No Don't know No response	1 2 8 9	

Section 8: STDs

801	Have you ever heard of disease that can be transmitted through sexual intercourse?	Yes No No response	1 2 9	→ 804
802	Can you describe any symptoms of STDs in women? **<u>Don't read out the</u>** **<u>symptoms</u>** **Circle 1 for all mentioned** **Circle 2 for all not mentioned** **More than one answer is possible**	Yes Abdominal pain 1 Genital discharge 1 Foul smelling Discharge 1 Burning pain on urination 1 Genital ulcer /sores 1 Swellings in groin area 1 Itching 1 Other 1 _____ No response	No 2 2 2 2 2 2 2 2 2	
803	Can you describe any symptoms of STDs in men? …. Any others? **Don't read out the symptoms** **Circle 1 for all mentioned** **Circle 2 for all not mentioned** **More than one answer is possible**	Yes Genital discharge 1 Burning pain on urination 1 Genital ulcers/sores 1 Swelling in Groin area 1 Other_____ 1 No response	No 2 2 2 2 2 2	
804	Have you had a genital discharge during the past 12 months?	Yes No Don't know No response	1 2 8 9	
805	Have you had a genital ulcer during the past 12 months?	Yes No Don't know No response	1 2 8 9	

Section 9: Knowledge, option, and attitudes.

901	Have you ever heard of HIV	Yes	1	→

	or the disease called AIDS?	No No response	2 9	stop
902a	Do you know anyone who is infected with HIV or who has died of AIDS?	Yes No Don't know No response	1 2 8 9	 →903 →903
902b	Do you have a close relative or close friend who is infected with HIV or has died of AIDS?	Yes, a close relative Yes, a close friend No No response	1 2 8 9	
903	Can people protect the virus that causes AID themselves from HIV by using a condom correctly every time they have sex?	Yes No Don't know No response	1 2 8 9	
904	Can person get HIV from mosquito bites?	Yes No Don't know No response	1 2 8 9	
905	Can people protect themselves from HIV by having one uninfected faithful sex partner?	Yes No Don't know No response	1 2 8 9	
906	Can people protect themselves from HIV by abstaining from sexual intercourse?	Yes No Don't know No response	1 2 8 9	
907	Can a person get HIV by sharing a meal with some one who is infected?	Yes No Don't know No response	1 2 8 9	
908	Can person get HIV by getting injection with a needle that was already used by someone else?	Yes No Don't know No response	1 2 8 9	
909	Do you think that a healthy looking person can be infected with HIV, the virus that causes AIDS?	Yes No Don't know No response	1 2 8 9	
910	Can a pregnant women infected with HIV or AIDS transmit the virus to her unborn child?	Yes No Don't know No response	1 2 8 9	 →912 →912

911	What can a pregnant woman do to reduce the risk of transmission of HIV to her unborn child? Don't read list Circle all that are mentioned		Yes	No		
		Antiretroviral	1	2		
		Others----------	1	2		
		--	1	2		
		Don't know	1	2		
		No response				
912	Can women with HIV or AIDS transmit the virus to her newborn child through breast-feeding?				Yes	1
					No	2
					Don't know	8
					No response	9
913	Is it possible in your community for some one to get a confidential test to find out if they are infected with HIV? By confidential, I mean that no one will know the result if you don't want them to know it				Yes	1
					No	2
					Don't know	8
					No response	9
914	I don't want to know the result but have you ever had an HIV test?				Yes	1
					No	2 →918
					Don't know	8 →918
					No response	9
915	Did you voluntarily undergo the HIV test, or were you required to have the test?				Yes	1
					No	2
					Don't know	8
					No response	9

916	Please do not tell me the result, but did you find out the result of your test?	Yes No Don't know No response	1 2 8 9	
917	When did you have your most recent HIV test?	With in the past year Between 1-2 years Between 2-4 years More than 4 years ago Don't know No response	1 2 3 4 8 9	
918	When do you prefer to take HIV test? Read out the choice	Never request If requested by physician If requested by sexual partner I don't know No response	1 2 3 4 9	
919	Do you think that having HIV test is beneficial for married couples?	Yes No Don't know No response	1 2 8 9	
920	Do you think that having HIV test is beneficial for pregnant women in your area?	Yes No Don't know No response	1 2 8 9	
921	Do you fill at risk of acquiring HIV infection due to your high-risk behavior?	Yes No Now I am carrier of the virus Don't know No response	1 2 3 8 9	

Now this is the end of our questionnaire. Thank you very much for taking time to answer these questions. We appreciate your help.

Annex 3.

Questionnaire used in ANC clinic.

01 Identification Numbers [----/----/----]

02 Sites of ANC service_____

03 Name of Data collectors(mid wife_____,Signature_____

04 Date of serum collected_____

1) Age in (years)[--------/---------]
2) Parity[----/----]
3) Marital status
    a) Married living with spouse
    b) Married living with spouse or any other sexual partner.
    c) Not married, living with sexual partner.
    d) Not married, not living with sexual partner.
    f) Married living with other sexual partner.
    g) No response.
4) Joint monthly family income [-----/------/-------]
5) Educational status
    a) Can't read or write
    b) Only read and write
    c) Grade 1-6
    d) Grade 7-9
    e) Grade 10-12
    f) Above Grade 12
6) Ethnicity.
    a) Amharah) Shinasha
    b) Oromoi) Agew
    c) Tigriek) Others----------
    d) Gurage
    f) Berta
    g) Gumuz
7) Residents
    a) Asosa town
    b) Out of Asosa town
8) Occupation
    a) House wife
    b) Students
    c) Government employee
    d) Merchants and small trading
    e) Farmer
    f) Others----------

Annex 4: Behavioral survey, indicators for adults men and women.

1) **Knowledge of HIV prevention methods**.

Numerator: Number of male /female respondents able to identify consistent condom use, mutually monogamy between HIV negative partners and abasing from sex as methods of reducing the risk of contracting HIV, in response to prompted question.

Denominator: total number of male/female respondents in survey.

2) **No incorrect beliefs about AIDS transmission**:

Numerator: Number of male /female respondents who in response to prompted questions correctly reject the two most common local misconception about AIDS transmission or prevention, and who know that a healthy looking person can transmit AIDS.

Denominator: total number of male/female respondents in survey.

3) **Number of non-regular partner in last year**: Which is the median number of sexual partner in the last 12 months who are not spousal or cohabiting and who are not commercial partner.

4) **Condom use at last sex with non-regular, non-commercial partner**.

*Numerato*r: number of male / female respondents who used a condom the last time they had sex with a non-regular (non-spousal, non-cohabiting and non-commercial) partner.

Denominator: Number of male and female respondents who have had sex with at least one non-regular partner in the past 12 months.

5). **Consistent condom use with non-regular, non-commercial partner:**

Numerator: number of male /female respondents who used a condom every time they had sex with any non-regular partner over the past 12 months.

Denominator: Number of male and female respondents who have had sex with at least one non-regular partner in the past 12 months.

6) Commercial sex in last 12 months (men only).

Numerator: Number of male respondents who have had sex with a female sex workers in the past 12 months.

Denominator: Total number of male respondents.

7) **Number of commercial partner in the last year (men only**): It is the median number of commercial sex partner in the last 12 months.

8) **Condom use at last sex with a commercial partner**.

Numerator: Number of male respondents who used a condom the last time they had sex with a commercial partner.

Denominator: Number of male respondents who have had sex with at least one commercial partner in the past 12 months.

9) Consistent condom use with commercial partner.

Numerator: Number of male respondents who used a condom every time they had sex with any commercial partner over the past year.

Denominator: Number of male respondents who have had sex with at least one commercial partner in the past 12 months.

10) Unprotected sex with a higher risk partner:

Numerator: Number of male /female respondents who reported not always using a condom with every non-regular partner and every commercial partner.

Denominator: total number of male /female respondents.

11) **Population seeking voluntary HIV test**:

Numerator: Number of respondents who have voluntarily requested an HIV test, received the test and received their result.

Denominator. Total number of respondents.

Annex 5.

Determinant factors for common misconception for HIV/AIDS transmission for the general population, Asosa, March 2001.

Variable	Have misconception		OR, 95 % CI	OR 95 %CI adjusted
	Yes n(%)	No n(%)		
Sex				
Male	188(40.3)	278(59.7)	1.0	1.0
Female	200(48.0)	217(52)	1.36 91.03-1.80)	1.08 (0.8-1.5)
Age (years)				
15-24	168(39.3)	260(60.7)	1.0	1.0
25-34	169(59.9)	170(50.1)	1.54(1.14-2.07)	0.94(0.5-1.5)
+35	51(44.0)	65(56.0)	1.21(0.79-1.88)	0.7(0.4-1.1)
Education				
Secondary and above	128(29.7)	303(70.3)	1.0	1.0
Elementary	178(53.9)	152(46.1)	2.77(2.03-3.78)	1.54(0.97-2.5)
Illiterate	51(44)	40(32.8)	3.02(1.85-4.92)	4.28(2.68-6.8)*
Religion				
Muslim	94(50)	94(50)	1.0	1.0
Orthodox	217(42.)	300(58.0)	0.72 (0.51-1.03)	0.8(0.5-1.5)
Other Christian	74(43)	98(57.9)	0.76(0.49-1.17)	0.9(0.6-1.4)
Ethnicity				
Amhara	147(39.7)	223(60.3)	1.0	1.0
Oromo	142(44.5)	177(55.5)	1.2(0.89-1.67)	1.4(0.9-2.24)
Berta	32(53.3)	28(46.7)	1.73(0.97-3.11)	1.4(0.8-2.30)
Other	58(49.2)	60(50.0)	1.47(0.95-2.27)	1.09(0.52-2.39)
Marital status				
Married	243(50.1)	242 (49.9)	1.0	1.0
Never married	121(37.9)	198(62.1)	0.61(0.45-0.82)	0.51(0.28-0.9)
Others	24(30.4)	55(69.6)	0.43(0.25-0.74)	0.72(0.41-1.28)
Residency duration				
One year and less	19(63.3)	11(36.7)	1.0	1.0
Two-ten years	195(41.4)	276(58.6)	0.41(0.18-0.93)	0.5(0.2-1.1)
Eleven and above	174(45.5)	208(54.5)	0.48(0.21-1.11)	1.3(0.94-1.7)

Note p value *<0.05, total n= 883 unless mentioned

Annex 6.

Determinant factors for common misconception for HIV/AIDS transmission among female sex workers Asosa, March 2001.

Variable	Have misconception		OR, 95 % CI	OR 95 %CI adjusted
	Yes n(%)	No n(%)		
Age (years)				
14-19	39(69.1)	24(38.1)	1.48(0.62-3.52)	0.5(0.2-1.4)
20-24	63(66.0)	41(39.4)	0.14(0.07-0.26)	0.5(0.2-1/3)
+25	22(52.4)	20(47.6)	1.0	1.0
Education				
Secondary and above	33(49.3)	34(50.7)	1.0	1.0
Elementary	50(58.8)	35(41.2)	1.47(0.73-2.95)	1.7(0.8-3.3)
Illiterate	41(71.9)	34(50.7)	1.24(0.61-2.54)	3.3(1.43-10.0)*
Religion (n=207)				
Muslim	22(59.5)	15(40.5)	1.0	1.0
Orthodox	54(58.7)	60(38.70	0.61(0.27-1.39)	0.7(0.3-1.7)
Other Christian	11(64.7)	8(53.3)	0.94(0.26-3.34)	1.4(0.4-6.4)
Ethnicity (=208)				
Amhara	59(59.6)	40(40.4)	1.0	1.0
Oromo	54((58.7)	38(41.3)	0.96(0.52-1.79)	0.8(0.4-1.6)
Other	11(64.7)	6(35.3)	1.24(0.38-4.15)	0.6(0.2-2.2)
Ever married				
Yes	52(67.55)	25(32.5)	1.0	1.0
No	72(54.5)	60(45.5)	0.58(0.31-1.08)	2.2(1.1-4.1)*
Residency duration				
One year and less	41(68.3)	19(31.7)	1.0	1.0
Two-five years	54(55.1)	44(44.9)	0.57(0.27-1.18)	1.9(0.9-4.0)
Six and above years	29(56.9)	22(43.1)	0.61(0.26-1.43)	1.8(0.7-4.5)
Worked as sex workers in other area				
Yes	104(57.8)	76(42.2)	1.0	1.0
No	20(69)	9(31.0)	1.62(0.66-4.10)	1.8(0.6-4.9)

Note p value * <0.05, total n=209 unless mentioned.