ADDIS ABABA UNIVERSITY

SCHOOL OF GRADUATE STUDIES

Assessment of HIV Sero-discordance among Couples Tested in Voluntary Counseling and Testing Center, Zewditu Memorial Hospital, Addis Ababa, Ethiopia

By: Yihalem Tamiru (B.Sc.)

Advisor: Professor Getnet Mitike (MD, MPH, PhD)

A THESIS SUBMITTED TO THE SCHOOL OF GRADUATE STUDIES OF ADDIS ABABA UNIVERSITY IN PARTIAL FULFILLMENT OF THE REQUIREMENTS FOR THE DEGREE OF MASTERS IN PUBLIC HEALTH

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School of Public Health
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APPROVED BY THE EXAMINING BOARD

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Examiner

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Examiner

DECLARATION

I, the undersigned, declare that this thesis is my original work in partial fulfillment of the requirements for the degree of Masters in Public Health. I also declare that it has never been presented in this or any other university and that all resources and materials used in the thesis have been duly acknowledged.

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Place of submission: Addis Ababa University

Date of submission: _____

This thesis has been submitted for examination with my approval as a university advisor.

Name: Professor Getnet Mitike (MD, MPH, PhD)

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Date: _____

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Acronyms

AIDS: Acquired Immunodeficiency Syndrome

AOR: Adjusted Odds Ratio

ART: Antiretroviral Therapy

CDC: Communicable Disease Control

CHCT: Couple HIV Counselling and Testing

CI: Confidence Interval

CSA: Central Statistical Agency

EDHS: Ethiopian Demographic and Health Survey

FMoH: Federal Ministry of Health

HAPCO: HIV/AIDS Prevention and Control Office

HTC: HIV Testing and Counselling

HIV: Human Immunodeficiency Virus

MARPs: Most-at-Risk Population

OR: Odds Ratio

PI: Principal Investigator

PLWH: People Living with HIV

RR: Relative Risk

SPSS: Software Package for Social Science Studies

STI: Sexually Transmitted Infections

UNAIDS: United Nations Program on AIDS

USAID: U.S. Agency for International Development

VCT: Voluntary Counselling and Testing

WHO: World Health Organization

Abstract

Background: Recent studies suggest that in sub-Saharan African, a large proportion of new HIV infections occur within sero-discordant couples and in countries with generalized HIV epidemics including Ethiopia sero-discordant relationships are common. Thus, it remains to be a major challenge to achieve the full impact of HIV/AIDS intervention.

Objective: To assess the magnitude of HIV sero-discordance and its associated factors among couples tested in Zewditu Memorial Hospital, Addis Ababa, Ethiopia.

Methods: Cross-sectional chart review for a total of 13,423 couples from January 2005 to December 2012 was conducted. Quantitative and qualitative data analyses were done to assess the magnitude and its associated factors with HIV sero-discordance among couples. To supplement the quantitative data in-depth interview was conducted in 4 sero-discordant couples and 3 VCT counselors. Data were entered using Epi-info version 3.5.3 and quantitative data was analyzed using SPSS for windows version 19 software. Qualitative data was transcribed based on the objectives of the study and the results were described in narratives using well-said verbatim.

Results: Among a total of 13,423 HIV tested couples 886 of them were HIV sero-discordant and the magnitude of sero-discordance was found to be 6.6%. Sero-discordance was more prevalent among married and widowed couples counting 20% and 16.4% respectively. Secondary education (AOR= 2.42; 95% CI: 1.527, 3.83); tertiary level (AOR=1.60; 95 % CI: 1.008, 2.54); able to read and write (AOR=2.68; 95% CI: 1.63,4.39); condom not used regularly in the last 3 months (AOR=2.145; 95% CI: 1.625, 2.831); suspected exposure within 4 to 6 months (AOR=2.31; 95% CI: 1.53, 3.50); suspected time over 6 months (AOR=1.98; 95% CI: 1.409, 2.79); employed (AOR=1.26; 95% CI: 1.03, 1.54); unskilled occupation (AOR= 1.851; 95% CI: 1.152, 2.975); housewife (AOR= 0.533; 95% CI: 0.38, 0.75); history of STI (AOR= 0.745; 95% CI: 0.56, 0.99) were statistically significant with HIV sero-discordance.

Conclusion and Recommendation: Substantial prevalence of sero-discordance was observed among married couples. Sero-discordant couples occupied with handful misconception and they are ambivalent for decision making. Sero-discordant result among couples is still mysterious; as a result, justify it from spiritual point of view and face many challenges and dilemmas. Intensive efforts should be made to encourage married couples aware of their own and their partners' sero-status. Empowering and educating community and ongoing counseling is recommended.

1. Introduction

1.1 Background

HIV/AIDS continued to be a significant global health problem according to the UNAIDS report. The estimated number of persons living with HIV worldwide in 2011 was 34.0 million [1]. There were also 2.5 million and 1.7 million new infections and AIDS-related deaths registered in 2011 respectively [1].

Sub-Saharan Africa is the most affected region in the global AIDS epidemic with an estimated 23.5 million people living with HIV; which counts 69% of the global total in 2011 and approximately 1.8 million people newly infected with HIV during the same year [1]. An estimated 1.2 million people died of AIDS, accounting for 71% of the worlds AIDS death in 2011 [1]. Most couples affected by HIV/AIDS in sub-Saharan Africa live in discordant relationships [2]. The prevalence of sero-discordant couples in population varies. In sub-Saharan Africa, studies have found rates of 3–20% sero-discordant couples in the general population, and higher rates of 20–35% in studies of those presenting to voluntary counseling and testing services [3]. Recent studies suggest that a large proportion of new HIV infections in countries with mature epidemics occur within sero-discordant partnerships and in countries with generalized HIV epidemics; as a result, in sub-Saharan African countries, sero-discordant relationships are common [4].

The first case of HIV in Ethiopia was reported in 1984 and HIV has taken millions of people's lives since its detection. Since the detection of the first two reported AIDS cases in 1986 in Ethiopia, the epidemic has rapidly spread throughout the country [5]. Likewise, the epidemic exhibits geographic variation and Ethiopia's HIV epidemic is heterogeneous among the population and more prevalent among female population as compared to the male in the same age group. As a result, females constitute 61% of the total people living with the virus [6].

HIV/AIDS has become a major public health and development challenge, leading the Government of Ethiopia to declare a public health emergency in 2002 [7]. According to HIV related estimates and projections report done by Ethiopian Heath and Nutrition Research Institute Federal Ministry of Health in 2013 showed that the national adult HIV prevalence was estimated to be 1.3% (0.9% males and 1.7% females) and the adult HIV incidence was 0.03% [8]. During

the same period, 734,048 people were estimated to be living with HIV and there were also 18,384 and 34,365 thousands of new HIV infections and AIDS deaths respectively [8].

The report also revealed that HIV prevalence in Addis Ababa was estimated to be 4.4% and an estimated 86,549 people were living with HIV and a total of 2,023 new HIV infections and 2,865 AIDS deaths [8].

HIV Counseling and Testing (HCT) is the key entry point to prevention, care, treatment and support services [9]. There are many potential benefits to supporting couples to test together for HIV infection and to mutually disclose their HIV status. Most importantly, together they can make informed decisions about HIV prevention. These benefits are relevant for all couples, whether they have the same HIV test results (HIV sero-concordant) or have different results (HIV sero-discordant) [10]. The findings of many published studies suggest couples who test together and mutually disclose their HIV status are more likely than those testing alone to adopt behavior to protect their partner [10].

Regardless of these significant numbers of discordant relationships, scant research has been conducted to assess the magnitude and factors associated with sero-discordant test results in Ethiopia. Therefore, this study was conducted to fill this gap by assessing the magnitude and associated factors with HIV sero-discordant couples to aid concerned bodies to make direct intervention measures and develop strategies towards these groups.

1.2 Statement of the Problem

Since the first evidence of the HIV epidemic in Ethiopia in 1984, HIV has claimed the lives of millions. As a result, the virus created significant challenges for the individuals, families and communities in the country. One of the major modes of transmitting the HIV virus is heterosexual intercourse among couples with discordant sero-status. A large number of HIV sero-discordant and sero negative concordant couples were living together for long period of time without using HIV prevention precautions [11]. Recent studies suggest that a large proportion of new HIV infections in generalized epidemics occur in these sero-discordant relationships [10]. This is partly because the majority of people in relationships are not aware of their own or their partner's HIV status. Thus, many are unknowingly vulnerable to HIV infection, couples with sero-discordant status sometimes find themselves as hardly believable for being sero-discordant, since they are having unprotected sexual practice and face the challenges and dilemma of making a decision for living together or divorce, also they feel ambivalent on decision making to have children or not and to exercise safer sexual practice.

In general, sero-discordance is poorly understood by the general population and health workers [10]. As the result, married or cohabiting couples started living together as HIV negative concordant have lost the opportunity of preventing HIV infection and became HIV sero-discordant and then HIV positive concordant. HIV sero-discordant couples are among one of the highest at risk population groups. As there is few studies that assessed sero-discordance among couples taking HIV test in Ethiopia, assessing this topic gives vital importance to enhance HIV sero-discordant prevention endeavors. Thus, the current study tried to determine the magnitude of the seo-discordant couples and explores the associated factors towards HIV sero-discordant status of couples at Zewditu Memorial Hospital.

2. Literature Review

2.1 Global and Regional Burden of HIV

The majority of HIV infection in sub-Saharan Africa occurs during heterosexual intercourse between couples in a relationship [12]. Studies show high levels of sero-discordance among stable couples are largely from sub-Saharan Africa [13]. The HIV-1 transmission in Africa mostly occurs among HIV-1-discordant couples (in which one partner is HIV-infected while the other one is not) who are unaware of their discordant HIV-1 sero-status [14].

A sero-discordant couple is a couple in which one partner is HIV-positive and the other partner is HIV-negative. Although one partner is currently HIV-negative, this does not mean that this partner is "immunized" or protected against being infected with HIV in the future. It is of paramount importance for sero-discordant couples to avoid transmission to the HIV-negative partner. It is possible for couples to remain HIV sero-discordant indefinitely if they consistently practice safer sex using male or female condoms [15].

A study conducted in five sub-Saharan HIV affected countries (Burkina Faso, Cameroon, Ghana, Kenya and Tanzania), showed that there were significant numbers of discordant cases and two thirds of the infected couples were discordant couples [16]. Between 30 and 40% of the infected sero-discordant couples were female partners [16].

2.2 Regional Prevalence for HIV Sero-discordance Couples

In sub-Saharan Africa, couple HIV discordance considerably contributes to the HIV epidemic and represents an unaddressed HIV prevention need [17]. Less than 10% of HIV sero-positive individuals know their partners status and only about 20% of HIV discordant couples know that they are living in a discordant relationship in East Africa [17].

Eastern and Southern African countries reported 12% and 18% HIV-1 discordance, respectively, with 15% HIV-1 discordance found across the whole study [18]. Among all couples tested who had at least one HIV-1 infected partner, the proportion of couples with HIV-1-discordant varied by study sites from 36-85% with an overall rate of 49% (14).

The percentages of couples in HIV sero-discordant relationships range from 5 to 31% in the various countries of Africa [19]. The prevalence of HIV discordance among married and cohabitating couples in sub-Saharan Africa is high [16]. With the prevalence rates ranging from 3% to 20% in the general population to over 60% among HIV infected married or cohabiting individuals [20]. Across countries such as Burkina Faso, Cameroon, Ghana, Kenya and Tanzania, between 30 and 40% of the infected couples are discordant female couples where the female partner only is infected [21].

In the study conducted at Romania revealed that 26% of couples were made-up an HIV-positive female and a non-infected male, and 24% were made-up of a non-infected female and an HIV-positive male [22].

Modeling of the effect of couple HIV testing and counseling on risk reduction among HIV discordant and sero-concordant uninfected couples in Zambia and Rwanda suggests that mutual knowledge of HIV status through CHTC would reduce annual HIV incidence among discordant cohabiting couples from 20% to as low as 7% in Zambia and 3% in Rwanda. These reductions would avert 36% to 60% of heterosexually transmitted infections that would otherwise occur in Zambia and 57% to 79% in Rwanda [23].

The proportion of heterosexual couples that are HIV sero-discordant is much higher than the proportion where both couples are HIV-positive [24]. In Tanzania and Kenya, the proportion of sero-discordant couples is at least twice as high as the proportion of sero-concordant couples. In

Kenya, the proportion of sero-discordant couples with female-infected partner is 60% higher than the proportion with male-infected partner [24]. On the other side, the analysis also shows that in most cases where a couple is HIV sero-discordant, the man is the infected partner [24]. In Lesotho for example, among the HIV-sero-discordant couples, male infected partner is twice as high as the female infected partner [24]. In Cameroon, there is no real difference seen between the proportion of male and female sero-discordant couples. In Mozambique, discordant couples are an important population at risk for new HIV infection and the percentage of discordant is higher than the percentage of couples that are concordant positive [25].

In the study conducted in Nigeria to determine the magnitude of HIV sero-discordance and the associated risk factors among couples visiting to the antiretroviral clinic, from the total of 100 couples tested for HIV sero-positivity, 52% were discordant while 48% were concordant. The peak HIV prevalence occurred in the 21-30 years old age group. History of extramarital affairs, alcoholism, viral subtype, age range and duration of marriage were seen as independent behavioral and sexual risk factors for HIV infection among spouses that were HIV-infected in sero-discordant relationship. Females accounted for the highest infection burden 32/52 (61.5%) compared to males 20/52 (38.5%) among those HIV-infected in sero-discordant relationship [26].

According to the study conducted in Kenya couples tested pre-marital, 15% had sero-discordant results. In the majority of discordant premarital couples, the woman were found to be HIV infected [27]. The study conducted in Uganda at couples at risk HIV-1 concordance and discordance among sexual partners receiving voluntary counseling and testing showed 9% of all couples and 18% of married couples were HIV discordant [28].

2.3 National Prevalence for HIV Sero-discordance Couples

According to the EDHS 2011, 98.3% of cohabiting couples were HIV negative, while 0.6% of couples with both partners were HIV positive and discordant couples constitute 1.1% of those tested [7]. Discordance is mostly marked in urban areas, among couples in the highest wealth quintile. Regarding regional HIV prevalence, Addis Ababa is the most affected region with 5.2% next to Gambella 6.5% prevalence. A higher percentage of couples found discordant when the woman is older, when the woman or the man has a secondary education, and when the couples are in the wealthiest quintile [7].

A retrospective cross-sectional study was conducted in Dessie, Ethiopia to assess the prevalence of sero-discordant test result and possible socio demographic and behavioral determinants. The prevalence of sero-discordance was found to be 9.8%. Of all study subjects 0.93% were concordant positive and 88.3% were concordant negative while the remaining 10.77% were discordant [29].

Moreover, in Bahir Dar Ethiopia a cross-sectional study was carried out to assess sero-prevalence of HIV, practice of preventive behavior and sexual behavior among premarital couples [30]. The findings of the study revealed that the prevalence of sero-discordance in this study was found to be 3.6% with 2.1% of concordance positive and 94.4% of concordant negative [30].

2.4 Factors Associated with HIV Sero-discordance Couples

Misconceptions about discordance are widespread among clients and counselors [21]. Common explanations include the concept of a hidden infection not detectable by HIV tests, belief in immunity, and the thought that gentle sex protected HIV-negative partners. Such explanations for discordance reinforce denial of HIV risk for the negative partner within discordant couples and potentially increase transmission risk. Couples identify negotiation of sexual relations as their most formidable challenge. Discordant couples represent a critical risk group and need for improved counseling protocols that clearly explain discordance emphasizing on high risk of transmission [31].

Migrant couples were more likely than non-migrant couples to have one or both partners infected. In the mathematical model, migrant men were 26 times more likely to be infected from outside their regular relationship than from inside. In other words, non-migrant men were 10 times more likely to be infected from outside their regular relationships than inside [32].

The proportion of circumcised men was higher among HIV-discordant couples which is 24% than among HIV- concordant couples, 6%. Of 24 circumcised men in HIV-discordant couples, 16 (67%) were found to be HIV negative [28]. Men in HIV-concordant couples were more likely than men in HIV-discordant couples to be living together with their sexual partner. In the same way, women in HIV-concordant couples were more likely than women in HIV-discordant couples to be living together with their sexual partner [28].

The study conducted for identifying reasons for not using condoms with multiple responses. Possible reason stated for not using a condom included: partner did not want to use (25.1%); my partner was also HIV positive (24.3%); desire to have a child (18%); sex did not feel the same with a condom (12.5%); not aware of the importance of condoms after sero-conversion (9.7%); were drunk and did not remember to use a condom (5.7%); had no condom available around (3.4%); condom use was against their religion (3.4%); fear of asking partner (2.8%); and thoughts that the partner did not get STI (1.1%) [33].

According to the study conducted in Uganda, the majority, (59%) of the participants desired to have children. The belief that their partner wanted to have children was a major determinant

irrespective of the HIV sero-status (adjusted odds ratio 24.0 (95% CI 9.15, 105.4)). Among couples in which the woman was HIV positive, young age and relatives' expectations for children were significantly associated with increased fertility desire, while among couples in which the man was positive; knowledge of ART effectiveness was associated with increased fertility desire. Availability of information on contraception was associated with decreased fertility desire [33].

The uncircumcised men were more likely to be in HIV-positive concordant couples than to be in discordant couples. Partners living in urban area were 4.7 times more at risk of being in a HIV-positive concordant relationship than to be in discordant relationship [34]. Other significant risk factors identified in the study include gender and educational level. The study conducted in Port Harcourt, Nigeria on premarital HIV testing in couples from Faith-based organizations, showed that infection rate was highest in the 25-29 years group and lowest in those of 35-39 years though the difference was not statistically significant [35]. The risk of HIV transmission through sexual intercourse from an HIV positive male to an HIV-negative female was estimated to be around 1 in 10 for less than 10 unprotected contacts and around 1 in 4 after 2,000 contacts [36].

The study conducted in Dessie Ethiopia, revealed that discordance was more prevalent among previously divorced and separated couples 22.4% and 22.8% respectively. The study also investigated that the married couples were significantly discordant than those premarital couples, OR= 2.408; 95% CI (1.26, 4.602); P=008 [29]. Higher prevalence of discordant serum outcome was observed among previously separated/divorced and widowed partners 6 (14.0%) and 3 (37.5%) respectively [37].

3. Objective

3.1 General Objective:

- To assess the magnitude of HIV sero-discordance and its associated factors among couples tested in Zewditu Memorial Hospital, Addis Ababa from January 2005 to December 2012.

3.2 Specific Objectives:

- To determine the magnitude of sero-discordance among couples tested at Zewditu Memorial Hospital.

- To identify factors associated with sero-discordance HIV test result at Zewditu Memorial Hospital.

- To explore the perceived factors towards the sero-discordant status at Zewditu Memorial Hospital.

4. Methods and Materials

4.1 Study Setting

The research was carried out in Addis Ababa city. The city is divided into 10 sub-city and 99 Kebeles and has a total population of 2,975,608. In the city, there are different level of facilities including government and private health institutions offering health services in the city. Thus, more than 37 governmental health centers and 10 governmental hospitals including referral are functional [38]. The HCT service is being provided in more than 225 centers. The HIV prevalence in Addis Ababa is estimated to be 4.4% with 3.0% and 5.8% for male and female respectively [8]. This study was conducted in Zewditu Memorial Hospital. This Hospital is one of the largest HIV clinics in Ethiopia, having many patients in its care. The hospital also deals with HCT services and has been providing the service for many years.

4.2 Study Design

Facility based cross sectional design was used to review the records of couples visiting the voluntary HIV counseling and testing center at Zewditu Memorial Hospital, Addis Ababa from January 2005 to December 2012. In order to complement the quantitative finding, qualitative data was collected by the principal investigator from five sero-discordant couples and three VCT counselors at Zewditu Memorial Hospital to get in-depth understanding of the perceived factors of sero-discordant results.

4.3 Source Population

The source population of this study was all couples who were $\geq$ 15 years of age and have already utilized the VCT service at Zewditu Memorial Hospital VCT center, Addis Ababa from January 2005 to December 2012.

4.4 Study Population

The study population was all couples who were $\geq$ 15 years of age and have already utilized the VCT service at Zewditu Memorial Hospital VCT center, Addis Ababa from January 2005 to December 2012.

4.5 Sample Size Determination

All couples' data within the time period from January 2005 to December 2012 were included and reviewed. Initially the crude data was 13,644 couples; however, through the data cleaning among this crude data only 13,423 couples' records were found with complete information. As a result the data analysis based on only a total of 13,423 couples records.

4.6 Sampling Procedures

The present study collected secondary data of all couples counseled and tested from January 2005 to December 2012. Moreover, in-depth interview was conducted with three counselors and four sero-discordant couples, at Zewditu Memorial Hospital, ART Center who were previously tested and counseled in the same institution during the specified time period.

4.6.1. Inclusion Criteria

Couples who visited Zewditu Memorial Hospital for HIV check up for different reason during January 2005 to December 2012 1) whose age was $\geq$ 15 years and 2) with complete records of pretest counseling, test results and post test counseling were included in the study.

4.6.2. Exclusion Criteria

Couples data that lack the major outcome variable (HIV test result) and one of the independent variables: date, age, sex, couple type, occupation, education, employment status and history of STI were excluded from the study.

4.7 Data Collection Procedures

Record Review

Data was collected using a data collection template prepared for this specific purpose. The data encompass socio-demographic characteristics like age, sex, education level, marital and employment status and behavioral information such as sexual history ever had sex with penetration, condom use and clinical information like history of STI. The data collection was carried out by health professionals (five counselors served as data collectors and one senior counselor and data manager were employed to serve as supervisors). The data collection team

was working in the same health facility. The data were collected by reviewing the client intake records from January 2005 to December 2012. They reviewed couples' records and identified records of the sero-discordant couples for filling out the data extraction format. Data collectors took a two days training about the objective of study, procedures to be followed during the data recording and filling.

Individual In-depth Interview

Qualitative data was captured by using in-depth interview with four sero-discordant couples and with three VCT counselors, who have agreed to be the study subjects and selected based on the set inclusion criteria at Zewditu Memorial Hospital. The principal investigator has briefly discussed the purpose of the study to the participants prior to the interview and those discordant couples who refused to be part of the study were given the right to decline from the study and only those who have given the consent were participated in the study. Each interview consumed from 40 minutes to an hour. During the interview, both the HIV positive and the negative partners had the chance to discuss their personal experience as partner living with a different HIV status. All the interviews were conducted by the principal investigator, which helped the respondents to get good understanding of the study and build confidence on the confidentiality of the data. All in-depth interviews were recorded using audio tape recorder. One of the discordant couple refused to be recorded during the interview but the interview was documented by taking notes.

4.8 Data Quality Assurance and Management

Data collectors had been trained about data quality management: data completeness, clear identification of unique numbers (code #) of the couples, record consistence with the client intake record format vs the developed template for data collection. Checking completeness and checking for missing data was undertaken by the data collectors every day under close supervision by the principal investigator periodically. All the completed data were cross-checked for completeness and consistency during all the process. Data with missed outcome variables were rejected accordingly (221 incomplete charts were rejected).

4.9 Data Analysis

Once the data were collected, it was entered and cleaned using EPI info version 3.5.3 and having finished the data cleaning process, the data transferred to SPSS 19 statistical soft ware for analysis. Descriptive statistics was done to determine the distribution and characteristics of the study population by using frequency and percentage. Descriptive results generated using tables and cross tabulations were used to see the relationships of the independent variable. Chi-square statistics and odds ratio with 95% confidence interval was used to assess the presence and degree of association between dependent and independent variables.

Multivariate and bivariate logistic regression was used to determine and uncover statistically significant and strength of associations between independent variable and the outcome variable. Possible confounding effects of selected variables were taken by using the multivariate analysis. Interpretation was done and accordingly and significance level of p-value 0.05 was considered for all results. All qualitative recorded data were first transcribed by the principal investigator and categorized the data as per the research sub thematic areas and the responses were categorized as per the research questions. The categorized data were interpreted and analyzed manually.

4.10 Study Variables

Dependent Variable

- HIV sero-discordant status

Independent Variables

- Socio demographic characteristics (age, sex, education, couple type, employment status, occupation)
- Behavioral variables (ever had sex with penetration, suspected exposure time, history of STI, casual partners, steady partners or life time sexual partners, condom use

4.11 Operational Definitions

Couples: Refers to two individuals (i.e. partners) who are in a relationship together. This may be a sexual relationship, or they may intend to be in a sexual relationship (i.e. pre-sexual). This is not limited to legally recognized couples, but is extended to casual and informal couples as well.

Sero-discordant Couple: Couples having different HIV-status; one is HIV-positive while the other is HIV-negative

Cohabitation: Living together like a married couple

Employed: Participants who were working for pay or had a job or business

Female Discordant: A couple in which the woman is HIV-positive and the man is HIV-negative

Sero-concordant: Both members of a couple having the same HIV status

Concordant Positive: Both members of a couple being HIV-positive

Concordant Negative: Both members of a couple being HIV-negative

Male Discordant: A couple in which the man is HIV-positive and the woman is HIV-negative

Partner: Each individual in a couple is regarded as the "partner" of the other.

Pre-sexual: Couples who intend to be in a sexual relationship

Sex-partner: Couples who have already started sexual practice

4.12 Ethical Considerations

Ethical clearance and approval was obtained from the Ethical Committee of the Addis Ababa University, College of Health Sciences, School of Public Health and the Addis Ababa Health Bureau. Then officials at Addis Ababa Health Bureau and Zewditu Memorial Hospital were communicated through formal letter written by the School of Public Health, and then permission was obtained at the regional bureau and at Zewditu Memorial Hospital. Furthermore, the confidentiality and privacy of the information was guaranteed to each in-depth interview participants, names were not mentioned in the data reviewed and identification of each records were done only through numerical codes. In addition the data was never accessed by a third person, except the principal investigator, and was kept private. Furthermore the data collection was carried out by using the VCT counselors who are working in the same institution. All ethical issues were considered throughout the data analysis process and anonymity of the study participants was maintained in all the process.

4.13 Dissemination of the Finding

The results of the study will be disseminated to Addis Ababa University, School of Public Health and Addis Ababa regional Health Bureau and will be shared to Zewditu Memorial Hospital at the end. Discussion will be held with the regional Health Bureau and Hospital VCT centers. The investigator will work together with the above mentioned bodies on how to use the results and recommendations of the study as input for the health services development of the country. The findings are expected to be presented in different local and international seminars, meetings and workshops. Finally, it will be submitted to a peer reviewed journal for possible publication.

5. Results

A total of 13,423 couples' records were reviewed. Among these couples' records, 886 sero-discordant couples were identified complete information, whereas, 221 (1.65%) couples' records were found incomplete and rejected as a result. Descriptive analysis results showed that a large majority of couples 90% were concordant negative and 3.4% were concordant positive while the remaining 6.6% of couples referred to as sero-discordant couples. Among HIV-affected couples, twice as many couples were discordant as compared to concordant positive. In other words, for every 30 couples tested in Zewditu Hospital VCT Center, 26 were concordant negative, one is concordant positive, and two are sero-discordant. The discordant couples were comparatively divided into male discordant and female discordant couples. From the sero-discordant couples, 42.4% are male discordant, and 57.6% were female discordant.

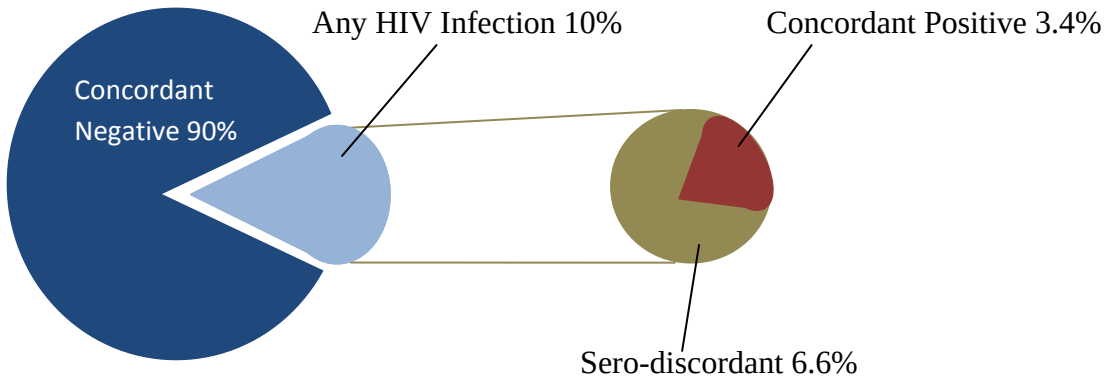

Figure 1: HIV Status of Couples in Voluntary Counseling and Testing Center, Zewditu Memorial Hospital, Addis Ababa, Ethiopia from January 2005 to December 2012.

Among all the couples, those with age range 25 to 29 years old took the highest proportion for couple counseling and testing service 29.7% while those aging 55 and above were the lowest 0.6% record. Out of the total couples records, with recorded history of premarital sex comprised the vast majority 37.4% followed by pre-sexual and sex partners 27.3% and 18.6% respectively. With regard to educational level, from the total couples 30.8% and 25% had tertiary and secondary educational level respectively and 2.8% of them were illiterate as showed in Table 1. The prevalence of HIV sero-discordant was observed higher in secondary educational levels, which were 25.5% while the prevalence shows decreasing at tertiary level 4.2% as showed in Table 3.

Table 1: Socio-demographic Characteristics of Study Participants, in Zewditu Memorial Hospital from Jan. 2005-Dec. 2012, Addis Ababa, Ethiopia (N=13423 Couples)

Socio-demographic Description of Study Subjects		
Description	**Frequency**	**Percentage**
Age		
15-19	832	6.2
20-24	3349	25.0
25-29	3985	29.7
30-34	2220	16.5
35-39	1500	11.2
40-44	695	5.2
45-49	400	3.0
50-54	225	1.7
55- and above	217	1.6
Couple Type		
Married	2228	16.6
Premarital	5026	37.4
Pre-sexual	3670	27.3
Sex partner	2499	18.6
Marital Status		
Married	2228	16.6
Never Married	9084	67.7
Separated	1359	10.1
Divorced	470	3.5
Widowed	113	0.8
Living together	390	2.9
Education		
Illiterate	379	2.8
Able to read and write	212	1.69
1-6 Primary	1184	8.8
7-12 Secondary	7318	54.5
Tertiary	4330	32.3
Employment Status		
Unemployed	3577	26.7
Employed	9846	73.3

Table 2: Behavioural and Clinical Characteristics of Study Participants, in Zewditu Memorial Hospital from Jan. 2005-Dec. 2012, Addis Ababa, Ethiopia (N=13423 Couples)

Behavioural and Clinical Description of Study Subjects		
Description	**Frequency**	**Percentage**
Reason for VCT service		
Client Risky/ Had risk	2342	17.45
Premarital	3853	28.7
Plan for future	7228	53.9
Ever had sex with penetration		
No	2516	18.7
Yes	10,907	81.3
Suspected exposure time		
< 1 Month	3264	24.3
1 to 3 Months	1220	9.1
4 to 6 Months	438	3.2
Over 6 Months	5388	40.2
Not exposed	3113	23.2
Condom use last 3 months		
Never	6204	46.2
Always	1904	14.2
Sometimes	596	4.4
N/A	4719	35.2
Used condom last time had sex		
Yes	3660	27.3
No	7136	53.2
N/A	2627	19.6
History of STI		
Yes	411	3.1
No	13012	96.9

5.1 Magnitude of Sero-discordant by Socio-demographic, Behavioral and Clinical Characteristics of Study Participants

Out of the total study subjects, 886 (6.6%) couples were found to be sero-discordant. Fifty six (14.5%) couples living together were found to be discordant while the prevalence of sero-discordance among never married accounted 318 (3.5%). Comparatively the highest prevalence of discordance was observed among married and widowed partners which were 433 (20%) and 38 (16.4%) respectively. The prevalence of sero-discordant among employed and unemployed were 628 (6.4%) and 259 (7.2%) respectively. Also the discordant serum outcome showed more prevalence among couples with secondary education 522 (25.5%) followed by the illiterate 97(12.8%). The sero-discordant prevalence among those couples with primary reason to get tested and know their status confirming positive result accounts for 51.7%, death or illness of previous partner for 38.8% followed by ill symptoms that was 32.4%. The prevalence of sero-discordance between those who had sex with penetration and those who have sex without penetration was 857 (7.9%) and 30 (1.2%) respectively. Higher prevalence of HIV sero-discordant was observed among participants who did not use condom during last time they had sex 622 (8.7%) than those who used condom last time they had sex 230 (6.3%). Sero-discordant prevalence was higher among those who had history of STI 39 (18.7%) than participants who had not history of STI 848 (6.4%) (Table 4).

Table 3: Socio-demographic Characteristics of the Study Participants by their Sero-discordant Status, in Zewditu Memorial Hospital from Jan. 2005-Dec. 2012, Addis Ababa, Ethiopia (N=13423 Couples)

	Sero-discordant	
	Yes	**No**
Description	**Freq. (Percent)**	**Freq. (Percent)**
Age		
15-19	24 (2.9)	806 (97.2)
20-24	118 (3.5)	3231 (96.5)
25-29	285 (5.4)	3771 (94.6)
30-34	143 (9.5)	2010 (90.5)
35-39	143 (9.5)	1358 (90.5)
40-44	85 (12.3)	610 (87.7)
45-49	45 (11.2)	356 (88.8)
50-54	24 (10.7)	200(89.3)
55 and above	19 (15.5)	195 (91.9)
Couple Type		
Married	433 (20.0)	1796 (80.6)
Premarital	209 (4.2)	4817 (95.8)
Pre-sexual	86 (2.3)	3584 (97.7)
Sex partner	158 (6.3)	2340 (93.7)
History of Marital Status		
Married	433 (20.0)	1606 (80.0)
Never Married	300 (3.5)	8766 (96.5)
Separated	50 (4.1)	1299 (95.9)
Divorced	34 (8.1)	428(91.9)
Widowed	19 (16.4)	104 (83.6)
Living together	50 (14.5)	334 (85.5)
Education		
Illiterate	49 (12.8)	330 (87.2)
Able to read and write	12 (10.7)	100 (89.3)
1-6 Primary	117 (9.8)	1068 (90.2)
7-12 Secondary	522 (25.5)	6686 (93.6)
Tertiary	174 (4.2)	3956 (95.8)
Other	12 (3.3)	397 (96.7)
Employment Status		
Employed	628 (6.4)	9218 (93.6)
Unemployed	258 (7.2)	3319 (92.8)

Table 4: Behavioral and Clinical Description of the Study Participants by their Sero-discordant Status, in Zewditu Memorial Hospital from Jan. 2005-Dec. 2012, Addis Ababa, Ethiopia (N=13423 Couples)

	Sero-discordant	
	Yes	**No**
Description	**Freq. (Percent)**	**Freq. (Percent)**
Ever had sex with penetration		
Yes	856 (7.9)	10051 (92.1)
No	30 (1.2)	2486 (98.8)
Suspected Exposure Time		
< 1 Month	329 (10.1)	2940 (89.9)
1 to 3 Months	154 (12.6)	1066 (87.4)
4 to 6 Months	37 (8.5)	397 (91.5)
Over 6 Months	316 (5.9)	5072 (94.1)
N/A	50 (1.6)	3062 (98.4)
Condom use last 3 Months		
Never	581 (9.4)	5623 (90.6)
Always	147 (7.7)	1758(92.3)
Sometimes	52 (8.6)	545 (91.4)
N/A	106 (2.3)	4611 (97.7)
Used condom last time had sex		
Yes	231 (6.3)	7430 (93.7)
No	623 (8.7)	2687 (91.3)
N/A	32 (1.3)	2420(98.7)
History of STI		
Yes	39 (18.7)	167 (81.3)
No	847 (6.4)	12370 (93.6)

5.2 Factors Associated with HIV Sero-discordant among Couples

Bivariate and multivariate logistic regression analyses were done to examine the relationships between the independent variables and couple sero-discordance. Bivariate logistic regression analysis was used to determine the strength of association between each independent variable and the outcome variable. Participants with the age group ranging from 25-29 (OR=1.910, 95% CI (1.411, 2.587) were found to be almost two times more likely to be sero-discordant as compared to the reference age 15-19. The study participants with the age group 30-34 (OR=3.534, 95% CI (2.607, 4.789) and 35-39 (OR=3.538, 95% CI (2.590, 4.832) were 3.5 times more likely to be sero-discordant as compared to the reference age group 15-19. The other age categories 40-44 (OR=4.7, 95% CI (3.391, 6.6544) and 55-59 (OR=4.69, 95% CI (2.922, 7.525) were 4.7 times more likely to be sero-discordant as compared to the reference age group. However, all the above mentioned age categories have never revealed any statistically significant association in multivariate logistic regression analysis (Table 5).

As the education level of the participants increases the chance of being HIV sero-discordant decreases. Sex (OR=0.999, 95% CI (0.907-1.100) did not show any significant association with sero-discordance. Premarital couples (OR=0.180, 95% CI (0.159, 0.203) were 82%, pre-sexual couples (OR=0.100, 95% CI (0.084, 0.118) were 90% less likely to be sero-discordant as compared to as a reference married couples.

Employed (OR=1.143, 95% CI (1.028, 1.271) were 1.14 times more likely to be sero-discordant showing statistically significant result. Housewives (OR=3.561, 95% CI (2.299, 5.517) were 3.56 times more likely to be sero-discordant as compared to the reference (officials and mangers) in the bivariate analysis. The couples with suspected exposure time less than one month (OR=6.731, 95% CI (5.447, 8.318) were 6.7 times more likely to be sero-discordant one to three months exposure time (OR=8.645 95% CI (6.874, 10.874) were 8.6 times more likely to be sero-discordant, four to six month (OR=5.596, 95% CI (4.111, 7.616) were 5.6 times more likely to be sero-discordant and those couples who had over six months exposure (OR=3.741, 95% CI (3.027, 4.622) were 3.7 times more likely to be sero-discordant when compared to the non exposed. Those couples who consistently used condom during the last three months (OR=0.807, 95% CI (0.706, 0.922) were 19% less likely to be sero-discordant as compared to those who have

never used condom. Those with history of STI (OR=3.363, 95% CI (2.612, 4.329) were 3.3 times more likely to be sero-discordant as compared to those with no history of STI.

Multivariate logistic regression analysis was done to determine the effect of selected independent variables on sero-discordance after controlling for other confounding variables. Pre-sexual couples (AOR=0.546, 95% CI (0.438, 0.681) were 45% less likely to be sero-discordant and in couples as sex partners (AOR=0.513, 95% CI (0.415, 0.634) were 49% less likely to be sero-discordant as compared to the married couples. Also those with education level grade 7-12 (AOR= 2.418, 95% CI (1.527, 3.828) were 2.4 times more likely to be sero-discordant and at tertiary level (AOR=1.600, 95% CI (1.008, 2.539) showed 60% more likely to be sero-discordant as compared to the illiterate group. Regarding employment, keeping the other factors constant, those employed (AOR=1.262, 95% CI (1.034, 1.539) were 26% more likely to be sero-discordant as compared to the unemployed ones.

Those with a history of STI (AOR= 0.745, 95% CI (0.562, 0.987) were 25.5% less likely to be sero-discordant. Pertaining to condom use, those participants who consistently used condom during the last three months (AOR=1.667, 95% CI (1.368, 2.032) were 67% more likely to be sero-discordant. However, those who used condom seldom (AOR=2.145, 95% CI (1.625, 2.831) were found to be 2.14 times more likely to be sero-discordant as compared to the reference. Regarding occupation, housewives (AOR=0.533, 95% CI (0.377, 0.754) were 46.7% less likely to be sero-discordant as compared to the reference (officials, managers), students (AOR=1.280, 95% CI (1.047, 1.565) were 28% more likely to be sero-discordant and skilled and fishery workers (AOR=1.225, 95% CI (1.008, 1.488) were 22% more likely to be sero-discordant (Table 5).

Table 5: Factors Associated with HIV Sero-discordant across Socio-demographic Characteristics among Study Participants, in Zewditu Memorial Hospital from Jan. 2005-Dec. 2012, Addis Ababa, Ethiopia

Factors Associated with HIV Sero-discordant across Socio-demographic Characteristics				
Variables	**COR**	**95% CI**	**AOR**	**95% CI**
Age				
15-19	1		1	
20-24	1.23	(0.899, 1.69)	0.85	(0.23, 3.03)
25-29	1.91	**(1.41, 2.59)****	0.83	(0.23, 2.94)
30-34	3.53	**(2.61, 4.79)****	1.08	(0.30, 3.81)
35-39	3.54	**(2.59, 4.83)****	1.68	(0.48, 5.95)
40-44	4.71	**(3.39, 6.54)****	1.41	(0.397, 4.98)
45-49	4.25	**(2.96, 6.10)****	1.48	(0.42, 5.26)
50-54	4.02	**(2.66, 6.09)****	1.19	(0.33, 4.26)
55-59	4.69	**(2.92, 7.53)****	1.03	(0.28, 3.75)
60-64	1.89	(0.73, 4.86)	1.13	(0.30, 4.20)
65-69	1.16	(0.28, 4.88)	0.38	(0.08, 1.81)
70 and above	4.38	**(1.27, 15.09)****	0.26	(0.04, 1.72)
Sex				
Male	1			1
Female	0.10	(0.91, 1.10)	0.95	(0.84,1.08)
Couple Type				
Married	1			1
Premarital	0.18	(0.16, 0.20)	1.31	(0.91, 1.87)
Pre-sexual	0.10	(0.08, 0.19)	0.55	**(0.44, 0.68)****
Sex partner	0.28	(0.25, 0.32)	0.51	**(0.42, 0.63)****
Education				
Illiterate	1			**1**
Able to read and write	0.82	(0.51, 1.31)	2.68	**(1.63, 4.39)****
1-6 Primary	0.74	**(0.58, 0.96) ****	1.72	(0.92, 3.23)
7-12 Secondary (Old)	0.71	**(0.56, 0.89) ****	2.42	**(1.53, 3.83)****

7-10 Secondary (New)	0.40	**(0.31, 0.52) ****	2.12	**(1.36, 3.28)****
11-12 (A Level)	0.40	**(0.28, 0.58)****	2.06	**(1.31, 3.24)****
11-12 (Vocation)	0.35	**(0.27, 0.47) ****	1.49	(0.89, 2.51)
Tertiary Level	0.30	**(0.24, 0.38)****	1.60	**(1.01, 2.54)****
Employment status				
Unemployed	1			**1**
Employed	1.14	**(1.03, 1.27)****	1.26	**(1.03, 1.54)****
Occupation				
Legislators, officials, Manager	1			**1**
Professionals	0.57	**(0.37, 0.88)****	1.29	(0.80, 2.08)
Technicians, Ass. Professional	0.64	(0.39, 1.04)	0.87	(0.67, 1.11)
Clerks	0.55	**(0.31, 0.98)****	0.85	(0.62, 1.16)
Service shop market sales	1.04	(0.68, 1.60)	0.64	(0.40, 1.00)
Skilled and fishery workers	0.38	(0.13, 1.11)	1.23	**(1.01, 1.49)****
Crafts and trade	1.27	(0.79, 2.03)	0.33	**(0.12, 0.93)****
Machine/plant	1.81	**(1.01, 3.23)****	1.27	(0.96, 1.69)
Elementary Occupation/unskilled	1.18	(0.77, 1.82)	1.85	**(1.15, 2.98)****
Student	0.27	**(0.16, 0.46)****	1.28	**(1.05, 1.57)****
House Wife	3.56	**(2.299, 5.52)****	0.53	**(0.38, 0.75)****
Armed force	0.87	(0.49, 1.55)	0.92	(0.74, 1.16)

Table 6: Factors Associated with HIV Sero-discordant across Behavioral and Clinical Characteristics among Study Participants, in Zewditu Memorial Hospital from Jan. 2005-Dec. 2012, Addis Ababa, Ethiopia

Factors Associated with HIV Sero-discordant Across Behavioral and Clinical Characteristics				
Variables	**COR**	**95% CI**	**AOR**	**95% CI**
Ever had sex with penetration				
No	**1**			**1**
Yes	7.06	**(5.45, 9.15)****	0.90	(0.38, 2.16)
Suspected exposure time				
< 1 Month	6.73	(**5.45, 8.32**)**	1.66	(**1.18, 2.34**)**
1 to 3 Months	8.65	**(6.87, 10.87)****	1.80	**(1.26, 2.57)****
4 to 6 Months	5.60	(**4.11, 7.62**)**	2.31	(**1.53, 3.50**)**
Over 6 Months	3.74	**(3.03, 4.62)****	1.98	**(1.41, 2.79)****
No suspected exposure	1			1
Condom use last 3 month				
Never	**1**			**1**
Always	0.81	**(0.71, 0.92)****	1.67	**(1.37, 2.03)****
Sometimes	0.92	(0.74, 1.13)	2.15	**(1.63, 2.83)****
N/A	0.23	(**0.195, 0.26**)**	2.30	(**1.71, 3.1**)**
Used condom last time had sex				
No	1			1
Yes	0.70	**(0.63, 0.79)****	0.89	(0.396, 2.01)
Does not remember	0.22	(0.03, 1.62)	0.90	(0.39, 2.04)
N/A	0.14	**(0.11, 0.18)****	0.46	(0.05, 3.93)
History of STI				
No	1			1
Yes	3.36	**(2.61, 4.33)****	0.75	**(0.56, 0.99)****

5.3 Findings from the In-depth Interview

Perceived Factors for being HIV Sero-discordant:

One respondent assertively reported that having a sero-discordant result is not a matter of taking appropriate prevention mechanisms instead it is the nature of the virus and Godly deeds. The other two interviewee pointed out that sero-discordance is taken as the result of mutual trust before and after their meetings. Since respondents with HIV sero-discordant couples believed that the result is due to some unexplainable happenings (eg. God deeds) they have developed risk taking behavior as there will not change the sero-discordant result in their future life.

… I think different HIV result occurred not because of negligence or carelessness…rather it is the nature of the virus and Godly deeds. Male HIV positive partner in discordant couples disclosed.

One respondent was hardly able to explain the reason for being sero-discordant. Perceived expectation of the association of HIV and other sexual related infections, in one was found to be confusing.

...our result should have been very similar since we are living and having sex together, but the result showed me that he got the virus and our result become different. "I thought he was just lying to me in our married life" a negative female discordant interview.

She meant that if one did not go or done something bad could be a reason for contracting the virus, then the virus by itself cannot go to somebody. Meaning, she felt that her mate was lying to her. To go further into 'unwanted' risk taking behavior, two respondents were unable to take or use condom for they want to have a child. This idea was initiated and insisted specially by females with HIV negative result but with HIV positive mate. Social norms and values for marriage seem to be merely influencing couple decision making. Two other discussants unwaveringly wanted to continue with their loved ones even though they were aware of the risk of contracting HIV. Generally speaking, inconsistent use of condom, misconception about the nature of the virus and due to religious beliefs, respondents with sero-discordant results were unable to take and direct their different HIV status and have no clue how to manage the different results in the future.

Factors associated with economic dependency especially when the male partner is HIV negative and his mate partner is HIV positive, the female partners always find themselves ambivalent for taking a decision either separation or taking preventive mechanisms. Among discordant couples, if the female is HIV positive, male are more ambivalent to continue than females, that is directly linked with economic dependency. One counsellor reported this in the following way: ...*those married couples mostly agreed to live together even though their HIV result is different but most of the premarital couple decide to depart right after they know the status of their partners.*

Misconception about HIV nature and blood group were very common among couples with sero-discordant result. Even though, couples believed that the reason for discordant is some unexplainable deeds, blood group, and among others, counsellors in the area have no scientific justification which can be taken as a root cause for discordant status. Hence, couples with sero-discordant results can't be given any justification for the occurrence.

Counsellors in the area responded in a very similar fashion about how couples with HIV sero-discordant result perceive regarding their sero-status and related factors for being discordant. One counsellor explained of discordant couples as follows: "The hands of God are really amazing; he can pick the blessed beans from the roasted one up". Temporary separations, such as long travel, field works, and the like incidents were taken as a justifying reason for explaining HIV discordant status. Couples with sero-discordant status sometimes find themselves as hardly believable for being sero-discordant, since they are having unprotected sexual practice. One counsellor said: "*it is quite difficult, discordant status is a new phenomenon for clients and for ourselves we thought...if the husband is positive, then the wife would not be exceptional. We always get ourselves with no information to hand on for our clients, since we don't have a scientific reason for it"*. From client and counsellors point of view, as described above on both qualitative and quantitative part, it seems very safe to say misconception on the one hand and having no scientific ground for being sero-discordant on another hand put both counsellors and clients with sero-discordant couples in a dilemma. Perception of counsellors on sero-discordant phenomenon explanation is very similar or no difference with sero-discordant couples explanation on the case.

6. Discussions

This study has revealed that, out of all couples, 6.6% of them were found to be HIV sero-discordant. This figure is relatively lower than the study conducted in Dessie, which showed prevalence of sero-discordance 9.8% [29]. Since different geographic area could have different environmental, social and economic conditions that might determine couple sexual behavior and attitude towards HIV infection. The variation of the prevalence is also the HIV epidemic heterogeneity between the regions as this variation has also observed in different African countries. Similar study conducted in Kenya revealed that 5.8% of the couples were found to be sero-discordant [39], which is consistent with the present finding.

This study has shown that 3.4% concordant positive and 6.6% sero-discordant couples and the remaining as concordant negative. Among HIV-infected couples, twice as many couples as concordant positive were discordant. Consistent with this study, the study done on HIV sero-discordance among heterosexual couples in sub-Saharan Africa showed the proportion of heterosexual couples that are HIV sero-discordant is much higher than the proportion where both couples are HIV-positive [24]. The distribution of being sero-discordant among females and males were 57.6% and 42.4% respectively and the number of female discordant was higher than discordant males. There was marked variation in the sex of the sero-positive partner which might be attributed to different reasons, including residence, biological make ups and other cultural or economical pushing factors among females [22].

In line with this, similar study conducted in Nigeria showed that females accounted for the highest infection burden 61.5% compared to males 38.5% among those HIV-infected in sero-discordant relationship [26]. In Tanzania and Kenya, the proportion of sero-discordant couples is at least twice as high as the proportion of sero-concordant couples [24]. Similar to the present study in Kenya shows the proportion of sero-discordant couples with female-infected partner is 60% higher than the proportion with male-infected partner [24], which is higher than the present finding. The studies conducted in different countries reflects almost similar phenomenon. Probably this indicates that the HIV/AIDS programmes still could not address harmful gender norms, sexual responsibilities, decision making and violence against women and forced sex might contribute to higher number of discordant females. Contrary to the above statistical

difference on the prevalence of sero-discordant among females and males, another study in Lesotho showed that the proportion of HIV-sero-discordant couples males were infected as twice as females [24].

In line with this, another study conducted in Addis Ababa showed that higher, in which 14%, separated/divorced couples were found to be discordant, while the prevalence of sero-discordant among widowed were 37.5% [37]. From couples who were found to be sero-discordant, the prevalence of sero-discordance among married couples in this study was 20%. This is in line with the finding of another study in Uganda in which 18% of married couples were found to be sero-discordant [40].

In this study, the educational status has shown a significant association with HIV sero-discordant status, which is different from other studies, conducted in Kampala [28]. In contrary to the above finding, the study undertaken in Addis Ababa showed that a, higher rate of HIV infection was observed among participants who were illiterate and only read and write than among those with educational status of secondary and above [37]. In another study in which higher rate of HIV infection was observed among those who had never attended regular school than those with secondary and above level of education [41]. There was significant difference between finding of this study and another study which was conducted before. This finding is supported by the EDHS study that was conducted in 2005 [42]. In school youth are vulnerable to HIV despite their educational background. Evidences clearly indicate that young people in high schools and tertiary level are vulnerable and at risk of being HIV infected due to various reasons [43].

Furthermore, in the present study high school students were more vulnerable despite their educational status. This argument is strictly in line with the study done by Federal HIV/AIDS Prevention and Control Office on the national HIV prevention package for MARPs and vulnerable groups [43]. This might be the students' in high school and tertiary level still they could not bring considerable change in the attitude and knowledge alone is not enough to prevent HIV/AIDS. This might be due to students in high school and tertiary level still might not able to bring considerable change in their attitude though they have knowledge about HIV/AIDS. Therefore, it is logical to draw a hypothesizing conclusion that knowledge could not be a way to prevent oneself from contracting the virus. In this study, among all the occupation types listed,

house wives and skilled laborers were found to be significantly associated for being sero-discordant. In similar study in Ethiopia, house wife and skilled laborers were significantly associated with sero-status [29]. In another similar study with contrary finding, a study from Uganda, showed that there was no significant association with sero-discordant status [28].

It seems safe to pronounce that the 'where to spent' is a matter for either having a sero-discordant status or not. The wives of those males in mobile working condition have no idea of what happened to their husband and the nature of mobile working condition might be the contributing factor for different HIV test result. When the partner goes away from home for certain mission, he/she might be infected with the virus on their return to home. This might have been a significant contributing factor for the sero-dicodance in present finding.

In the present study being employed has statistically significant association with sero-discordance. In another study conducted in Dessie, Ethiopia being unemployed had no statistically significant association with sero-discordant status [29].

In this study, using condom during last time had sex was found to be significantly associated, at a univariate level, again this association lost significance at multivariate level [44]. Sero-discordance was identified as a major challenge for couples as well as for VCT counsellors for explaining how a couple can be discordant by giving a scientific reason for the occurrence. The present study was similar with the qualitative study done in Uganda [3]. During the in depth interview of both informants, the researcher identified misconceptions, denial, mutual trust, risk taking behaviour, to be factors associated with sero-discordant result.

The identified misconception includes perceptions on the accuracy of the HIV tests when sero-discordant test result was known. Supportive to the present result, a study done in Uganda [45], which reported that behavioural characteristics of couples were statistically significant for having a sero-discordant result. Two other discussants unwaveringly want to continue their relationship with their loved ones even though they became aware of the risk of contracting HIV. Especially those married discordant couples mostly preferred to staying together even though they do have different HIV result. The idea of stay together is mostly supported by HIV negative partners due to various reasons. Some of the common reasons mentioned by discordant couples and counselors were the need to have children, being economically dependent and fear of stigma and

discrimination of the society. This finding is consistent with the study conducted in Dessie, Ethiopia [29]. In my opinion having different HIV test result among couples is a serious problem because it requires couples to make serious decisions on their future relationship based on their status.

The qualitative study revealed that, due to the cultural importance of children, sero-discordant couples were unable to take or use condom to have a child. This problem was observed specially among females with HIV negative result but with HIV positive mate. Due to this, discordant couples go further into unwanted risk taking behavior. This findings are consistent with the study conducted in Uganda which also reported a similar result [33].

Another study conducted for identified reasons for not using condoms with possible multiple responses: reason stated for not using a condom included: partner did not want to use (25.1%); my partner was also HIV positive (24.3%); desire to have a child (18%); sex did not feel the same with a condom (12.5%); not aware of the importance of condoms after sero-conversion (9.7%); were drunk and did not remember to use a condom (5.7%); had no condom available (3.4%); condom use was against their religion (3.4%); fear of asking partner (2.8%); and thoughts that the partner did not have an STI (1.1%) [33]. Also misconception and risk taking behavior about HIV was identified as a risk factor. In this study during the in-depth interview, there was a low self risk perception of infection with HIV especially from the negative client side due to this risk taking behaviors take place.

The qualitative finding showed that there is still exists misconception in the communities and this finding goes with the findings of HIV/AIDS behavioral surveillance (BSS) conducted in Ethiopia which argued that there is a misconception in the Ethiopia context [46].

Couples with HIV sero-discordant result participated in the present study used to explain the phenomena as a religious matter even though they still want to explore more on the fundamental and justifiable reason for such sero-discordant result while they are having sex unprotected. To go further in to it, those couples with sero-discordant result, especially the positive partner, hardly preoccupied being HIV positive while the other partner as HIV negative is totally unacceptable and unconvincing. Sero-discordant couples appeared to believe that the phenomenon of different HIV status is much higher than scientific explanations [47]. They

believed that sero-discordant HIV status happened because of the following issues: the negative partner is actually infected but the virus was not detected by the blood test because the quality of test is poor, the HIV-negative partner has “blood group O” or is immune to HIV and the HIV-negative partner is protected by God. More significantly, sero-discordant couples mostly associated the phenomenon with spiritual justification and strongly believe that the positive partner will also get cure from the virus some other day in the future by the help of God. This finding is in line with the study conducted in Uganda [45].

Therefore, from this one could manage to reach at a convincing conclusion that sero-discordant couples have very limited information about HIV sero-discordant result and they are occupied with handful misconception. When we see the findings of the qualitative study, it has some association with the findings explored in the quantitative part.

Those couples with a history of a sexually transmitted infection (STIs) were found to be significantly associated with HIV sero-discordant result than those with none. It may be any damage to the protective lining of the female genital tract and the male genital organ which increases the likely hood of having the risk of HIV virus. Another study conducted in Mozambique, between the couples if the man had an STI or symptoms of an STI, he was less likely than from those did not have an STI to be male discordant versus concordant positive. In the same study, couples with neither of the members had an STI in the past year are more likely to be discordant than couples in which either member has had an STI [48].

Unlike this study, most other studies done in Ethiopia and Uganda, history of STI was not significantly associated with couple sero-discordant status, and similarly, a study done in Uganda among couples voluntarily counseled and tested claims absence of significant association [28], [29].

7. Limitations and Strengths of the Study

Limitations:

- Since the research was based on secondary data which is already existing information that has been gathered, the research analysis was limited to this data level.
- Data was collected from a single voluntary HIV counseling and testing center; as a result, it is difficult to generalize.

Strengths:

- The study used a large sample size data.
- Since the secondary data used for this research was collected and supervised by counselors, who were familiar with the data collection instruments, it increases its reliability.
- Employed both quantitative and qualitative for strengthening the findings of the study.

8. Conclusions

The result of this study showed the magnitude of HIV sero-discordance among couples was low (6.6%) of which majority was married couples. Age and sex (being female and male) did not show any association with HIV sero-discordant result.

Furthermore, HIV sero-discordant was found to be significantly associated with employed, sex partners, pre-sexual, condom use during the last three months and those who had suspected exposure time and history of STI. In addition working conditions like elementary occupation (lower class) and being a house-wife was found statistically significant.

The qualitative part of this study identified HIV sero-discordant couples have very limited information about different HIV test result even do not have any idea that there is a possibility for sero-discordant result occur among couples before they have got counseled and tested. This indicates that sero-discordant couples occupied with handful misconception. Eeconomic dependency, love, having children and fearing social stigma and discrimination from the society make sero-discordant couples to be ambivalent for decision making.

The real cause of different HIV test results among couples is still mysterious; as a result, while scientific community hypothesis from scientific view, whereas, the sero-discordant couples justify it from spiritual point of view. Moreover, sero-discordant couples believed that sero-discordant HIV status occurs due to the following perceived factors: the negative partner is already infected but the virus was not detected by the blood test, the HIV negative partner has “blood group O” or he/she is immune to HIV, the negative partner is protected by God.

9. Recommendations

- The VCT counselors should gain additional training to enhance their knowledge and skills to handle the discordant couples' issues. Besides, the VCT counselors have to update themselves through reading recent scientific findings. To facilitate this it will be good if the VCT centers have mini library equipped with various scientific literatures and online Internet access on HIV/AIDS particularly on sero-discordant couples. Furthermore, the issue of sero-discordant should be addressed in the pre-service training curriculum at college or university level an integrated approach with other related courses. On the other hand, empowering and educating community to improve awareness on HIV sero-discordant status by preparing tailored message is recommended.

- The HIV sero-discordant couples should discuss freely the issues as a couple and plan their future life based on their different HIV status accordingly. Furthermore, health workers in general and VCT counselors in particular should help sero-discordant couples to develop risk-reduction and preventive behaviors and also empowered on positive living strategies.

- Since this research was based on single VCT center data, to complement, future studies are recommended by using both qualitative and quantitative methods based on data collected form multi health facilities. Another area for further research is recommended to investigate additional associated factors for sero-discordant result.

- Since the current HIV/AIDS policy document does not address the issue of sero-discordant phenomenon; hence, due emphasis should be given to HIV sero-discordant couples when it will be revised.

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11. ANNEXES

11.1 Data Collection Template

SECTION I: DESCRIPTION OF THE VCT CENTER			
Zewditu Memorial Hospital VCT Centre Code No:__001_____			
	Date of visit		Remark
SECTION II: SOCIO-DEMOGRAPHIC CHARACTERSTICS			
	Couple code		
100	Age	_____years	
101	Sex	1. Male 2. Female	
102	Couple type	1. Married 2. Premarital 3. Pre sexual 4. Sex partner	
103	Marital status	1. Married 2. Never married 3. Separated 4. Divorced 5. Widowed 6.Living together	
104	Occupation	1. Legislators, managers 2. Technicians 3. Clerks 4. Service, shop 5. Skilled and fishery workers 6. Crafts and trades 7. Plant/machine 8. Elementary Occup/Unskilled. 9. Student 10.Housewife 11. Armed forces	
105	Education	0. Illiterate 1. Able to read 2. 1-6 Primary 3. 7-12 Secondary old 4. 7-10 Secondary new 5. 11-12 (A Level) 6. Tertiary	
106	Employed	0. No 1. Yes	
SECTION III: INFORMATION ACCESS TO THE SERVICE (HOW HEAR OF VCT SERVICE)			

200	From which heard the VCT service	1. Radio 2. Out reach 3. Posters 4. Other clients 5. Newspaper/magazine 6. Health institution 7. Telephone hotline 8. Anti AIDS clubs 9. APLWH/A 10. Friends & family 11. CBO 12. TV 98. N/A 99. Other	
201	Most important reason here today/Primary reason here today for HIV testing	1. Client risky/had risk 2. Partner risky/ had risk 3. Not trust partner 4. Ill/symptoms 5. Premarital 6. Marital reunion 7. Family planning 8. Visa applicant 9. Referred 10. 2nd test/window/ 11. Confirm positive result 12. Get results previously test 13. Need counseling 14. Test before pregnant 15. Pregnant must know 16.Plan for future 17.Death/illness of partner 18. Occupational exposure 19. Other blood/fluid exposure 20. Sexual assault 21. Preliminary ART 99. Other	
SECTION IV: SEXUAL BEHAVIOR OF CLIENTS			
300	Ever had sex with penetration	0. No 1. Yes	
301	Suspected exposure time had between	1. <1 month 2. 1 to 3 months	

		3. 4 to 6 months 4. over 6 months 98. No suspected exposure	
302	Condom use during the last 3 months	0. Never 1. Always 2. Sometimes 98. N/A	
303	Used condom during last time had sex	0. No 1. Yes 97. Doesn't remember 98. N/A	
304	History of STI	0. No 1. Yes 97. Don't know 98 .N/A	
SECTION VI: HIV TEST RESULT			
400	Male HIV result	0. Negative 1. Positive	
401	Female HIV result	0. Negative 1. Positive	

11.2 Amharic Version of the Questionnaire

በአዲስ አበባ ዩኒቨርሲቲ

የህብረተሰብ ጤና ትምህርት ቤት

የጥንዶች የኤች አይ ቪ ምርመራ ውጤቶች መለያየት ጋር በተያያዘ በመላ ምት ደረጃ ተያያዥነት ሊኖራቸው ይችል ይሆን ተብሎ በሚገመቱ ጉዳዮች ዙሪያ ለሚደረግ ጥናት በዘውዲቱ ሆስፒታል የኤች አይ ቪ ምክርና ምርመራ አገልግሎት መስጫ ማእከል የተለያዩ የኤች አይ ቪ የምርመራ ውጤት በሚያጋጥማቸው ጥንዶች በቃለ ምልልስ አማካኝነት በድምፅ የሚቀረጥ መጠይቅ፡፡

መግቢያ

በጥንድ ሆነው የኤች አይ ቪ ምርመራ ካደረጉ በኃላ የውጤት መለያየት ያጋጠማቸውን ጥንዶችን ጥናቱን የሚያጠናው አካል ያነጋግራቸዋል፡፡ የዚህ ጥናት አላማ በጥንድ ሆነው የኤች አይ ቪ ምርመራ አድርገው የተለያየ ውጤት በሚያጋጥማቸው ሰዎች ላይ በመላ ምት ደረጃ ተያያዥነት ሊኖራቸው ይችል ይሆን ተብሎ ሊገመቱ በሚችሉ ጉዳዩችን ከራሳቸው ከጥንዶች ለማወቅ ና ለወደፊቱ አስፈላጊውን ጤና ጋር ተያያዥነት ያላቸውን እቅድ ና እርምጃ በ ፖሊሲ አውጪዎች እንዲወሰድ ለማመቻቸት ነው፡፡ ስለራሳችሁ አንዳንድ ጥያቄዎችን እጠይቃችኃለሁ፡፡

የምትሰጡኝ ምላሽ ሚስጢራዊነቱ ከማንኛውም አካል የተጠበቀ ነው፡፡ ስማችሁም በዚህ ፎርም ላይ አይሞላም አይፃፍም፡፡ በመሆኑም ይህንን ቃለ መጠየቅ መመለስ የምትችሉት በፈቃደኝነት ነው የግድ መመለስ አይጠበቅባችሁም፡፡ ነገር ግን ለምንጠይቃችሁ ጥያቄዎች ነፃ ሆናችሁ የምትሰጡን ቅን ና ትክክለኛ መልስ ጥናቱ የተሟላ እንዲሆን ና ለወደፊቱ አስፈላጊውን ጤና ነክ እርምጃዎች ለመውሰድ በጣም ጠቃሚ ና አስፈላጊ ነው፡፡

ለምንጠይቃችሁ ጥያቄዎች ያለማመንታት ለምትሰጡን ምላሽ ከወዲሁ ላቅ ያለ ምስጋና ማቅረብ እንፈልጋለን:: ግልፅ ነው? ስለዚህ ጥናቱ ላይ ስመሳተፍ ፍቃደኛ ነዎት?

1- **አዎ** 2- **አይደለሁም**

ፈቃደኝነታችሁን ያረጋገጠው መረጃ ሰብሳቢ ስም ና ፊርማ

ስም---------- **ፊርማ**---------- **ቀን**----------

1. **እስኪ እባካችሁ ስለእናንተ ሁኔታ ስለፍቅር ህይወታችሁ በተመለከተ ልታጫውቱኝ ትችላላችሁ**

2. **በእናንተ እምነት የተለያየ የኤች አይ ቪ ውጤት እንዲሆን ወይም እንዲከሰት ካደረጉት ምክናያቶች ውስጥ ልትነግሩኝ ትችላላችሁ**

Declaration

I the undersigned declare that this thesis is my original work in partial fulfillment of the requirement for the degree of Master of Public Health. I also declare that it has never been presented in this or any other university and that all resources and materials used in the thesis have been duly acknowledged.

Name of the student: _____

Signature: _____

Place of submission: _____

Date of submission: _____

This thesis has been submitted for examination with my approval as a university advisor

Name of the primary advisor: Professor Getnet Mitike (MD, MPH, PhD)

Signature: _____

Date of submission: _____

11.3 Conceptual Framework for Determinant Factors for Sero-discordant Couples

A conceptual framework delineating the factors hypothesized to be associated with sero-discordance couples and it includes factors expected to have an association and shows the relationship to the desired outcome variable (Figure 2).