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Determining factors of late HIV diagnosis in Northern Ethiopia

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ABSTRACT

Background: Late diagnosis results in delayed treatment, higher medical costs and an increased risk of mortality. However many HIV-infected patients in Africa are often diagnosed at very advanced stages of the disease. This study aims to identify factors involved with late HIV diagnosis.
Method: facility based cross-sectional survey was conducted at public health facilities which provide HIV care in Northern Ethiopia from January to May 2011. Four hundred thirty-seven HIV diagnosed patients who were on ART care and had a CD4 cell count within three months of their first HIV diagnosis were taken as study subjects. The impact of the variables on the likelihood of late testing was analyzed using binary logistic regression. P-values less than 0.05 and 95% confidence intervals were used to determine an association between independent and dependent variables.
Results: Sixty two percent of the study subjects were defined as late testers. Males were twice as likely to test late as compared to females [2.12(1.25- 3.59)]. Having more than six sexual partners in life time was significantly associated with lower risks to testing late [0.22(0.05-0.88)]. Testing for health related reasons showed a significant positive association ($p<0.001$). Those who had health problems prior to their HIV diagnosis came late for HIV testing [2.27(1.52-3.38)]. Fever persists for one month and unexplained weight loss were positively associated with late HIV diagnosis. Drug users were positively associated with late testing. Testing with medical consultation was associated with higher risks of late diagnosis. Testing during pregnancy follow up lowers the risk of late testing.
Conclusion: HIV infected population groups at a higher risk of late HIV testing. The risk factors identified to be associated with late testing should be utilized in formulating targeted public health interventions in order to improve early HIV diagnosis.

Key words: late HIV diagnosis, Northern Ethiopia.

INTRODUCTION

HIV/AIDS remains a very serious medical concern and continues to be a major global health priority. In 2008, the number of people living with HIV worldwide was estimated to be 33.4 million [31.1 million-35.8 million] (UNAIDS and WHO, 2009). Among these, 31.3 million were adults, 2.7million were newly infected people in the year 2008. AIDS-related illnesses remain one of the leading causes of death globally and are projected to continue as a significant global cause of premature mortality in the coming decades (Coovadia, 2005). Globally, 1.7 million [1.4 million-2.1 million] adult AIDS related deaths were registered in the year 2008 (UNAIDS and WHO, 2009). Sub-Saharan Africa remains the region most heavily affected by HIV worldwide, accounting for over two thirds (67%) of all people living with HIV and for nearly three quarters (72%) of AIDS-related deaths in 2008 (Sub-saharan Africa Latest Epidemiological Trends, 2009). An estimated 1.9 million [1.6 million–2.2 million] people were newly infected with HIV in sub-Saharan Africa in 2008, bringing to 22.4 million of people living with HIV. The prevalence of HIV among adult population in Ethiopia for 2009 was estimated at 2.2 % which has a severe impact on the overall health situation in the country (Ethiopian Federal Ministry of health, 2007). Due to the effects of the HIV pandemic, life expectancy at birth has dropped by seven years and the number of children orphaned due to AIDS was estimated to be 898,350 (International Federation of Red Cross, 2010).Since the reporting of Ethiopia's first HIV and AIDS cases, its HIV epidemic has evolved into a generalized epidemic, and AIDS is now the leading cause of morbidity and mortality among adults in Ethiopia (Hladik *et al.,* 2006). In 2009, adult annual AIDS deaths were estimated to be 71,902 and it was projected that 28,073 deaths would be documented by 2010 (Ethiopian Federal Ministry of health, 2007).The adult prevalence of HIV in Amhara Regional State, Northern Ethiopia, according to FHAPCO single point estimate was estimated to be 2.7% which is higher than most part of the country. HIV counseling and testing (HCT) is a key strategic entry point to prevention, treatment, care and support services. This is critically important for individuals and couples to learn about their HIV status and make informed decisions about their future (EFMOH and FHAPCO, 2007). Immunodeficiency is considered to be advanced with any

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CD4-cell count below 200/mcl (Salzberger, 2009). Early diagnosis of human immunodeficiency virus (HIV) infection has great clinical and public health impact (Paul, 2008). Early HIV diagnosis and timely administration of antiretroviral therapy can result in not only the reduction of morbidities and mortalities in HIV-infected patients, but also decrease of patients' viral load and risk of HIV transmission in public health aspects[10]. However, excess disease and death continue to plague the HIV infected population (Yi-Chun *et al*., 2008). This residual burden is likely multi factorial, but much of it can be attributed to late HIV diagnosis (Korner, 2007). It appears that little is known of late HIV diagnosis in Ethiopia, a knowledge gap that needs to be addressed. Here, identification of factors associated with late HIV-diagnosis concomitantly with perceived barriers to testing in South Wollo Zone has been explored.

MATERIALS AND METHODS

Study design

Facility based cross-sectional survey was conducted in selected public health facilities which provide HIV testing and HIV care services in South Wollo Zone from January to May 2011.South Wollo Zone is one of the 11 zones of the Amhara Regional State, Northern Ethiopia. According to the national population and housing census of Ethiopia, the projected population of the zone for 2011 was estimated to be 3,036,532. There were 3 public hospitals, 39 health centers, and 270 functioning health posts at the time of the survey. According to the FHAPCO single point estimate for prevalence of HIV/AIDS in Amhara Region, the Adult HIV prevalence for 2007 was estimated to be 2.7% (Ethiopian Federal Ministry of health, 2007). The total number of patients who were on ART treatment in Dessie Referral Hospital, Kombolcha Health Center, Dessie Health Center, Boru Meda Hospital and Haik Health Center were 8,279, 3000, 2,375, 1,885 and 1000 respectively. Health facilities that render ART care services in the zone were identified. By simple random sampling two hospitals (Dessie Referral and Boru Meda) and three health centers (Kombolcha, Dessie) where selected. The calculated sample was proportionally allocated, based on the case load of each health facility. Finally, those who started ART care within three months of their first positive HIV test, and aged 18 and above years old were included in the study until the allocated sample size was attained. Data collection was carried out using pre-tested, interviewer administered and structured questionnaire. The patients' first CD4 count was collected through record review. The questionnaire was prepared in English and translated to Amharic (the local language) and subsequently translated back to English. Nurses assigned in each health facility to collect the data. Supervisors followed the data collectors and provided any necessary correction on the spot. Ethical approval of the study was obtained from the Addis Ababa University Ethical review board. Letter of permission was obtained from Zonal Health Department and respective health facilities. The participants were informed about the purpose of the study and oral consent was obtained from each study participant prior to conducting the interview.

Sample size determination

A sample size calculation was determined using single-population proportion formula with the following assumption. $N= (Z\alpha/2\ pq)/d^2$, $Z\alpha/2 =1.96$, P= proportion of late HIV diagnoses was 0.45 [13]; and q=1-p, d=0.05, precision/margin of error. The sample size =380, and 15% non-response rate = 437.

Statistical Analysis

Data was entered using EPI INFO version 3.5.1 software and analyzed using SPSS 17. It was checked for its completeness, cleaned and analyzed accordingly. Frequencies were used to describe variables. Multivariate analysis was used to determine the presence of any statistically significant associations between the dependent and the independent variables. A p-value of <0.05 was considered statistically significant.

RESULTS

A total of 437 interviewed HIV/AIDS patients were included in the analysis. Two-hundred seventy individuals (61.8%) were late testers. Mean age was 32 (± 8years). The majority, (93.6%) were in the age group 18-45 years. The ratio of female to male subjects was 2:1.

Table 1. Socio-demographic and socio-economic characteristics of study participants in South Wollo Zone, Northern Ethiopia, January 2011 (n=437)

Variable	Frequency (n=437)	Percent (100%)
Age group		
18-31	242	55.4
32-45	167	38.2
46-59	24	5.5
≥ 60	4	0.9
Mean age ± SD	32±8	
Sex		
Male	153	35.0
Female	284	65.0
Religion		
Orthodox	148	33.9
Muslim	265	60.6
Catholic	15	3.4
Protestant	9	2.1
Ethnicity		
Amhara	415	95.0
Others	22	5.0
Marital status		
Single	59	13.5
Married/living together	189	43.2
Married/ not living together	34	7.8
Divorced	79	18.1
Widowed	76	17.4
Educational status		
Cannot read and write	107	24.5
Read and write/ informal	38	8.7
Read and write/ formal	292	66.8
Occupation		
House wife	96	22.0
Merchant	73	16.7
Daily laborer	111	25.4
Student	13	3.0
Government employed	44	10.1
Farmer	83	19.0
House maid	11	2.5
Commercial sex worker	6	1.4
Area of residence		
Urban	327	74.8
Rural	110	25.2

Table 2. Factors related to HIV testing history, Behavior and Health system among respondents of South Wollo Zone, Northern Ethiopia, 2011 (n=437)

Variables	Frequency (n=437)	Percent
Having health complaints		
Yes	187	42.8
No	250	57.2
HIV/AIDS related symptoms		
Oral candidiasis	28	6.4
Fever persist for one month	77	17.6
Unexplained weight loss	42	9.6
Diarrhea persist for one month	20	4.0
Pruritic popular eruption	57	13.0
Herpes zoster	36	8.2
Reasons for testing		
Voluntary screening campaign	30	6.9
Feeling at risk	141	32.3
Having sickness/symptoms	266	60.9
With medical consultations	73	16.7
During pregnancy follow up	25	5.7
Availability of ART	7	1.6
History of HIV test refusal		
Yes	38	8.7
No	399	91.3
HIV status of sexual partner		
Positive	164	37.5
Negative	58	13.3
No partner/ spouse	50	11.4
Do not know	165	37.8
Drug usage		
Yes	33	7.6
No	404	92.4
Alcohol consumption		
Heavy	27	6.2
Moderate	116	26.5
None	294	67.3
Sexual partners at diagnosis		
One	240	54.9
Two	46	10.5
≥3	41	9.4
None	110	25.2
Life time sexual partners		
≤3	290	66.4
4-6	86	19.7
≥6	38	8.7
Having sex with commercial sex workers		
Yes	67	15.3
No	98	22.4
Trust in health workers		
Completely	343	78.5
Limited	84	19.2
No trust	10	2.3
Distance from health facility		
<30 minutes	219	50.1
30minutes-2 hours	127	29.1

One hundred eighty nine (43.2%) were married and living together, 79(18.1%) were divorced, 76 (17.4%) were widowed, 59 (13.5%) were single, and 34(7.8%) were married but not living together. Two hundred sixty five (60.6%) of the study population was Muslim, 148 (33.9%) Orthodox, 15(3.4%) Catholic, and 9 (2.1%) protestant. Majority, (95%) were Amhara and 22 (5%) were others by ethnicity. One hundred eleven, (25.4%) were daily laborers, 96(22.0%) were house wives, 83(19.0%) were farmers, 73(16.7%) were merchants, 44(10.1%) were government employees, 13(3.0%) were students, 11(2.5%) were house maids and 6(1.4%) were commercial sex workers. Regarding educational status, 107(24.5%) were unable to read and write, 38 (8.7%) were informally educated, and 292(66.8%) were involved in modern type of education. Three hundred twenty seven (74.8%) respondents were live in urban, while 110 (25.2%) were live in rural area. (Table1).

Factors related to HIV testing history, Behavior and Health system

The results are summarized in table 2. One hundred eighty seven (42.8%) had health complaints at the time of their HIV diagnosis. Fever persist for 1 month (n=77), oral candidiasis (n=28), unexplained weight loss (n=42), diarrhea (n=20), Pruritic popular eruption (n=57) and herpes zoster (n=36). Voluntary screening campaign (n=141), risk perception (n=266), medical consultation (n=73), pregnancy follow up (n=25), and availability of ART (n=7) were their reasons to undergone HIV testing. Only 8.7% of the respondents had history of HIV test refusal. HIV status of spouse /sexual partner of the respondents were positive (37.5%), negative (13.3%), no partner or spouse (11.4%), and unknown (37.8%).Majority of them, 92.4% (n=404) were not drug users. Of the interviewees, 67.3% (n=294) never drank

Table 3. Predicting factors of late HIV diagnosis in South Wollo Zone, Northern Ethiopia, 2011

Variable	Late HIV diagnosis		COR (95%CI)	AOR (95%CI)
	Yes	No		
Sex				
Male	105	48	1.58 (1.04- 2.39)	2.12 (1.25- 3.59)
Female	165	119	1	1
Reasons for testing				
Voluntary screening campaign	12	18	0.39 (0.18- 0.82)	0.80 (0.30- 2.13)
Felt at risk of HIV infection	76	65	0.62 (0.41- 0.93)	1.27 (0.71- 2.25)
Having sickness/symptoms	194	72	3.37 (2.25- 5.05)	3.22 (1.80- 5.79)
With medical consultation	54	19	1.95 (1.11- 3.42)	2.33 (1.17- 4.61)
During pregnancy follow up	7	18	0.22 (0.09- 0.54)	0.29 (0.09- 0.94)
Availability of ART	5	2	1	1
Health problems prior to HIV diagnosis				
Yes	188	84	2.27 (1.52-3.38)	2,27(1.52-3.38)
No	82	83	1	1
HIV/AIDS related symptoms				
Oral candidiasis	21	7	0.49 (0.18-1.20)	0.52 (0.22-1.25)
Fever persist for one month	58	19	2.00 (1.12-3.00)	2.13 (1.22-3.73)
Unexplained weight loss	32	10	1.81 (1.01-3.92)	2.11 (1.91-4.42)
Diarrhea persist for one month	13	7	0.80 (0.24-2.06)	0.87 (0.34-2.21)
Pruritic popular eruption	41	16	0.47 (0.3-1.20)	0.59 (0.32-1.09)
Herpes zoster			1	1
Drug usage				
Yes	26	7	2.44 (1.03- 5.8)	3.86 (1.44- 10.36)
No	244	160	1	1
Sexual partners/ life time				
Three and below	181	109	0.14 (0.33- 3.72)	0.13 (0.20- 2.54)
Four up to six	47	39	0.39 (0.13- 1.19)	0.44 (0.12- 1.66)
Six and above	25	13	0.28 (0.09- 0.91)	0.22 (0.05- 0.88)
None	17	6	1	1

alcohol, 26.5% (n=116) were social drinkers, and 6.2% (n=27) were heavy alcohol users. Of the respondents, 240(54.9%) had one sexual partner, 46(10.5) had two, 41(9.4%) had more than three, and 110(25.2%) hadn't had any sexual partner at the time of diagnosis. Two-hundred ninety (66.4%) of the respondents had one sexual partner, 86(19.7%) had four up to six, 38(8.7%) had above six sexual partners in their life time. Among male respondents, 67 of them had history of sex with commercial sex workers. Trust in health workers to put their health above all other concerns, 78.5% (n=343) said completely, 19.2% (n=84) said limited, and 2.3% (n=10) said no trust at all. Half (n=219) of the interviewees lived in a distance took less than 30 minutes from the nearest health facility.

Predicting factors of late HIV diagnosis

Table 3 summarized the final logistic regression model, male gender showed a significant positive association for HIV testing [AOR, 2.12; 95% CI, 1.25- 3.59].Testing for health related reasons increased the likelihood of being late three times ($p<0.001$). Testing with medical consultation showed a significant positive association with late diagnosis [AOR, 2.33; 95%CI, 1.17- 4.61]. Those who had health problems prior to their HIV diagnosis came late for HIV testing [AOR, 2.27; 95%CI, 1.52-3.38]. Among HIV related symptoms, fever persists for one month and unexplained weight loss were positively associated with late HIV diagnosis, [AOR, 2.13; 95%CI, 1.22-3.73], and [AOR, 2.11; 95%CI, 1.91-4.42] respectively. Drug users had almost four times the odds of presenting late compared to non users. Those who had more than six sexual partners in their life time were diagnosed early [AOR, 0.22; 95%CI, 0.05- 0.88]. And testing during pregnancy follow up decreases the likelihood of having had a CD4 cell count of <200cells/µl at diagnosis [AOR, 0.29; 95%CI, 0.09-0.94].

DISCUSSION

Although Ethiopia has a National HIV program offering free diagnosis and treatment, 61.8% of HIV patients in South Wollo zone, Northern Ethiopia present late for diagnosis with an initial CD4 counts below 200cells/µl. The proportion of late diagnosis found in this study is higher compared with reports of other countries that use the same definition for late diagnosis. According to a review study in Europe called late diagnosis of HIV in Europe: definitional and public health challenges, the overall incidence of late HIV diagnosis has been reported 15% to 38% (Adler *et al*., 2010). In Gabon 45% of the patients had a CD4 cell count below 200 cells/µl (Okome-Nkoumou *et al*., 2005), 31% in Texas[26], 37.3% in South Korea[16], 40% in Venezuela (Maeva *et al*., 2008), This large figure (61.8%) may be attributed to low perceived risk of HIV infection. This study has identified factors associated with late HIV diagnosis in South Wollo Zone, Northern Ethiopia. In accordance with other studies examining HIV-testing behavior and late HIV diagnosis, it has been found that male sex (Korner, 2007; Okome-Nkoumou *et al*., 2005; Adler *et al*., 2010; Wolbers *et al*., 2008; Jin-Hee *c* 2010; Maeva *et al*., 2008; Couturier and Michon, 1998), testing for medical reasons (Girardi and Monforte, 2007; Dore *et al.,* 2002), perceived risk of HIV-infection due to having had many sexual partners prior to HIV testing (Adler *et al.,*2010; Maeva *et al.,* 2008; Jack *et al.,* 2008; Couturier and Michon,1998; Boyd *et al.,* 2005; Korner, 2007) showed an association with late diagnosis, and testing during pregnancy follow up decreases the likelihood of women presenting late to diagnosis (Korner, 2007; Wolbers *et al.,* 2008; Couturier and Michon, 1998). In this study, men had almost double as likely to present late as women. This pattern was found in large western studies, which report that men were more likely to present late, France (Couturier and Michon, 1998) , Spain (Adler *et al.,* 2010), Italy (Jack and Charles, 2008), the United States

(Biru and Naqi, 2010) and Venezuela (Maeva *et al.,*2008). And in contrast with a study in Sweden which showed males were less likely to present late (Wolbers *et al*., 2008). The lower proportion of females being late presenters can be attributed to a higher uptake of voluntary counseling and testing services by the females as part of routine health care services during pregnancy. Testing due to illness was strongly associated with late testing [OR, 3.22; 95%CI, 1.80- 5.80]. This finding was in line with a study in South Korea (Jin-Hee *et al.,* 2010) that indicated the proportion of individuals with a late diagnosis was higher in individuals tested due to health related reasons. According to a study in Australia (Korner, 2007) testing was usually motivated by a serious health crisis. Majority (65%) of late testers in US tested because of illness (Biru and Naqi, 2010). Another study in US also described that most patients were diagnosed after they had developed symptoms of HIV disease, but by then their immune system had already experienced permanent damage (Valdisseri, 2007). This finding strengthens the above finding, testing due to illness. Testing with medical consultation was also independently associated with late testing. Drug users were positively associated with late diagnosis (p=0.007). This is similar to the findings in France (Couturier and Michon, 1998), UK (Saul *et al*., 2000) and Switzerland (Wolbers *et al*., 2008).Having had more than six sexual partners in life time prior to HIV diagnosis in this study was independently showed a negative association with late testing. This can be interpreted by using perceived risk of HIV infection. Testing during pregnancy follow up independently associated with late testing. Those tested during their ANC follow up were less likely to have a CD4 cell count less than 200 cells/µl. This indicated antenatal testing was routinely offered in the area.

Conclusion

This study shows that even in the frame of free HIV control programs, efforts must still be directed to offer PITC as part of routine prevention activities by health professionals and on the availability of the services offered by the HIV program. Moreover, one of the policy statements in the guideline for HIV counseling and testing in Ethiopia said PITC shall be promoted as part of standard clinical management and care in all health facilities (EFMOH and FHAPCO, 2007). But, only 47% of clients who come to health facilities were counseled and tested in 2008 (CU-ICAP *et al*., 2009). Although Ethiopia offers free diagnosis and treatment as part of its National HIV program, large proportion of individuals present late for HIV diagnosis in South Wollo Zone, Northern Ethiopia. Identification of specific factors associated with delay in HIV diagnosis; men, testing because of illness, testing with medical consultation drug usage, and health problems prior to their HIV diagnosis will be useful in the development of targeted public health interventions in increasing the likelihood of early diagnosis.

List of abbreviations

AIDS - Acquired Immuno Deficiency Syndrome
AOR- Adjusted Odds Ratio
ART -Antiretroviral Therapy
COR-Crude Odds Ratio
CU-ICAP Columbia University's International Center for AIDS Care and Treatment Programs
FHAPCO -Federal HIV/AIDS Prevention and Control Office
FMOH -Federal Ministry of Health
HIV -Human Immuno Deficiency Virus
KAB -Knowledge, Attitude and Behavior
PITC Provider- Initiated HIV Testing and Counselling
SPSS -Statistical Package for Social Sciences
TB -Tuberculosis
UNICEF -United Nations Children's Fund
VCT -Voluntary HIV Counseling and Testing
WHO- World Health Organization

Authors' Contributions

YM, EM and AM were involved in the design, conception, and conduct of the study, the analysis and interpretation of the findings. EM and YM: involved in analysis, interpretation and writes up of the manuscript. All the authors read and approved the final content of the manuscript.

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